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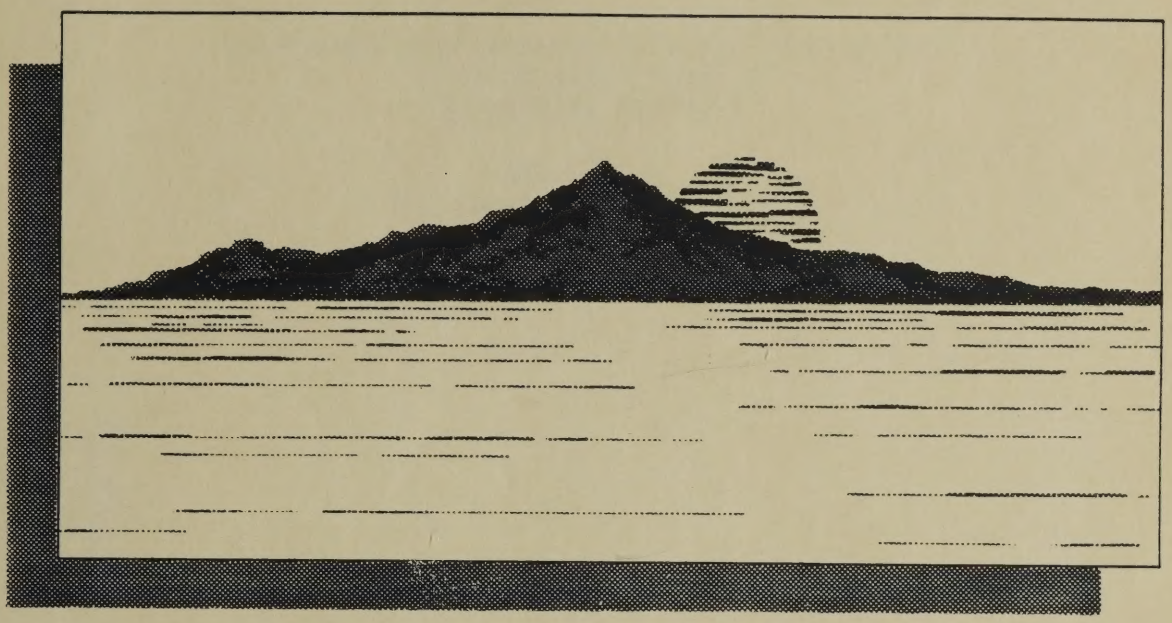

# MEAD/McCULLOUGH–VICTORVILLE/ADELANTO

## TRANSMISSION PROJECT

## TECHNICAL REPORT

VOLUME II
NATURAL ENVIRONMENT

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# MEAD/McCULLOUGH-VICTORVILLE/ADELANTO TRANSMISSION PROJECT TECHNICAL REPORT

## VOLUME II
## NATURAL ENVIRONMENT

Prepared by:

Dames & Moore

Prepared for:

Los Angeles Department
of Water and Power
U.S. Department of the Interior
Bureau of Land Management

June 1985

CHAPTER 2
METEOROLOGY/AIR QUALITY

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## METEOROLOGY AND AIR QUALITY

### INTRODUCTION

This report describes the meteorology and air quality of the study area for the proposed Mead/McCullough-Victorville/Adelanto Transmission Project. The study was conducted by Ms. Cynthia Folks, Assistant Engineer for Dames & Moore. Ms. Folks holds a B.S. degree in Environmental Engineering, and works in the Environmental and Permitting Group of Dames & Moore's Santa Barbara, California office.

### INVENTORY RESULTS

#### Meteorology

#### Regional Climate

The project area lies within the southwest portion of Nevada, across the Nevada/California state border and through the Mojave Desert parallel to Interstate 15. The meteorology of the region is typical of the Mojave Desert (High Desert) region of Nevada and California with hot dry summers and cool dry winters. Large daily and seasonal temperature differences are in evidence due primarily to the coastal mountain ranges which inhibit the penetration of marine air into the High Desert.

Precipitation is sparse and infrequent. The semi-permanent Pacific High Pressure Cell, which resides over the west coast during much of the year, keeps most storm systems north of the area. Extreme temperatures range from well over 100°F during summer to below freezing (32°F) during winter. Temperatures vary considerably with altitude.

#### Wind

Seasonal and diurnal wind regimes markedly affect the horizontal transport of air in the project area. Atmospheric stability associated with these winds determines the air dispersion of pollutants. Wind data sites at Edwards Air Force Base, Daggett, Nipton, and Cadiz were selected to represent wind data of the project area.

Table 2-1 shows the frequency distribution of wind speed and direction for the period of time between January 1968 and December 1970 from Edwards Air Force Base. The predominant wind direction for this area is west-southwest. The mean wind speed is approximately 8.8 miles per hour.

Table 2-2 shows the percentage frequency of wind direction and speed for the years 1955 through 1964 from Daggett, California. From the data, it is evident that the prevailing wind direction is from the west and west-northwest. The annual mean wind speed is approximately 11.3 miles per hour.

Table 2-3 shows the wind direction frequency distribution for the data sites of Nipton and Cadiz, California. The data collected (June 1979 to August 1979 in Nipton) shows that, during nighttime hours (0000 - 0500 PST), easterly drainage flow is dominant; otherwise, southerly winds dominate during the summer season. During the winter season, northerly winds will periodically dominate the flow regime in the Ivanpah Valley.

The Cadiz wind data collected during the summer months of July and August 1979 show that the prevailing wind direction is from the southeast with approximately 50 percent of the hours reporting winds from the east through south directions. Taking into account the terrain and other data from similar locations, it appears that the wind flow pattens in the Cadiz area would be from the northwest the majority of the time, and from the south or southeast during the summer.

### Temperature and Humidity

Diurnal temperature ranges (defined as the difference between the daily maximum and minimum temperature) are large, up to 30°F to 40°F, due to the efficient heating and cooling of the land surface under generally clear skies. Temperatures frequently exceed 100°F during summer and occasionally dip below 32°F during winter.

Temperature data sites at Barstow, Daggett, Las Vegas, Yucca Grove (about 26 miles southwest of Ivanpah), and Victorville, were used to evaluate the monthly average temperatures of the project area. These monthly average temperatures for the various sites are shown in Table 2-4. From the data, it is evident that the warmest temperatures will be experienced in July and the coolest in January.

Highest relative humidities are recorded during winter nights due to the low temperatures, whereas spring and summer afternoons experience the driest conditions due to excessively hot temperatures at this time.

### Precipitation

Precipitation varies with altitude and is affected by local mountain ranges. In general, annual precipitation on the desert floor ranges between 3.0 inches (Baker) and 5.4 inches (Victorville). Table 2-5 shows average monthly precipitation recorded for various representative sites: Baker, Barstow, Daggett, Las Vegas, and Victorville. Precipitation is higher in the mountains, such as the Clark Range, as is shown by changes in vegetation. Precipitation is highly variable from year to year. Much of a year's precipitation may fall in a few storms. Occasional violent thunderstorms cause much localized runoff, filling local washes and washing out local roads. During wet years the playas (dry lakes) may remain filled for months, then stay dry for several consecutive years.

Thunderstorms occur infrequently over the study area. Thunderstorms are observed an average of 15 days per year in Las Vegas. Occurrences of lightning striking the ground can vary greatly in an area but, in general, depends on elevation and latitude.

## Air Quality

Effects of ambient air quality within an area depend on the characteristics of the receptors (population, crop, etc.) and the type, amount, and duration of exposure. Air quality standards specify upper limits of concentrations and durations of pollutants in the ambient air consistent with the management goal of preventing specific harmful effects. Air quality standards and background air quality information pertinent to the project area are described below.

### Ambient Air Quality Standards

The U.S. Environmental Protection Agency (EPA), the California Air Resources Board (ARB), and the Nevada Department of Environmental Protection (NDEP) have established ambient air quality standards. National ambient air quality standards (NAAQS) specify acceptable pollutant concentrations which may be equaled and, in the case of short-term standards, exceeded up to once per year. California ambient air quality standards (CAAQS) specify unacceptable pollutant concentrations which should never be equaled or exceeded. Nevada ambient air quality standards specify pollutant concentrations that should not be exceeded. Table 2-6 summarizes the current Federal and state standards.

On December 9, 1982, the California ARB approved new ambient air quality standards for fine particulate matter (less than 10 $\mu$m diameter) of 50 $\mu g/m^3$ (24-hour average) and 30 $\mu g/m^3$ (annual average). These standards have been formally adopted and replace the previous standards for particulate matter of 100 $\mu g/m^3$ (24-hour averaging period) and 60 $\mu g/m^3$ (annual averaging period). The replacement of the NAAQS for particulate matter with a fine particulate matter standard was proposed on March 20, 1984 (49 FR 10408), but final action has not yet been taken.

### Existing Air Quality

The project site is located within the Southeast Desert Air Basin of California and within the portion of Nevada southwest of Lake Mead to the California/Nevada border. The available California air quality data (California ARB, annual summary) supplied information for Victorville and Barstow, the nearest locations in the project area. Clark County Health Department supplied air quality data for Las Vegas and Henderson, Nevada, also located in the project area. The air contaminants of interest in characterizing the existing air quality in the project area are oxidants ($O_3$), carbon monoxide (CO), oxides of nitrogen ($NO_x$, measured as $NO_2$), sulfur dioxide ($SO_2$), total

suspended particulates (TSP), sulfates ($SO_4$), lead (Pb), and nitrates ($NO_3$). A review of available air quality data for the three-year period 1981 through 1983 is presented in the following sections.

## Attainment/Nonattainment Areas

The air quality of the project area encompasses part of southwest Nevada and part of San Bernardino County, California. For the Las Vegas Valley the region is classified by the EPA as "nonattainment" for oxidants, carbon monoxide, and particulate matter. For the remaining major pollutants ($NO_2$, $SO_2$), this portion of Nevada is classified as "unclassified or better than national standards." For the Nevada portion of the project area near Lake Mead southwest to the California/Nevada border, excluding Las Vegas Valley, the region is classified by EPA as an "attainment" area for all major pollutants.

That portion of the project area located in San Bernardino County, part of the Southeast Desert Air Basin (from the California/Nevada border parallel or nearly parallel to Interstate 15 southwest to and including Victorville and the surrounding area), is classified as "nonattainment" for oxidants and particulate matter. All other major pollutants ($SO_2$, $NO_x$, CO) are classified as "unclassified" or "unclassified or better than national standards." It is generally believed that violations of the oxidant and particulate standards result from the transport of pollutants into the area from the South Coast Air Basin to the southwest as well as wind-blown fugitive dust (40 CFR 81).

## Oxidants

Oxidants are formed in the atmosphere through a series of complex reactions, primarily involving reactive hydrocarbons and nitrogen oxides in the presence of sunlight. Ozone is the principal oxidant compound in the California atmosphere (California ARB 1976). For this reason, and the fact that measured oxidant concentrations are often reported as ozone, oxidant and ozone are often considered synonymous.

Maximum hourly ozone concentrations generally occur during afternoon hours between April and September. Concentrations are generally higher in rural areas than in adjacent urban areas, probably because of the scavenging effect of urban nitric oxide emissions on ozone concentrations.

Maximum one-hour concentrations measured during 1981-1983 in the project vicinity are shown in Table 2-7. Also shown are the number of hours and calendar days when the CAAQS were reached and/or exceeded and when the NAAQS were exceeded. These data indicate that both Barstow and Victorville, in San Bernardino County, exceed the Federal standard for ozone (0.12 ppm) and the state standard (0.10 ppm) a few times a year. Measured ozone levels in Victorville reached pollution levels high enough to warrant a Stage I episode (0.20 ppm) during two of the three years. Data collected at

Las Vegas and Henderson, in Clark County, indicate infrequent exceedances of the Nevada and Federal ozone standard (0.12 ppm).

## Carbon Monoxide

Most carbon monoxide emissions occur in urban areas, primarily due to motor vehicles, coal combustion sources, and industrial processes. In nonurban areas, carbon monoxide emissions result primarily from forest fires and agricultural burning.

Maximum one-hour and eight-hour average CO concentrations for the project area are shown in Table 2-8. Also shown are the number of exceedances of the CO standards. There were no violations of the one-hour or eight-hour standards for CO in the past three years for the California monitoring stations presented. The eight-hour CO standard (9 ppm) was exceeded in Las Vegas all three years (1981-1983). The one-hour standard was not exceeded during this period.

## Nitrogen Dioxide

Nitrogen dioxide ($NO_2$) is an indirect product of fuel combustion by industrial sources and motor vehicles. $NO_x$ emissions are typically emitted largely as nitric oxide (NO) and are subsequently oxidized to nitrogen dioxide ($NO_2$) in the atmosphere. Diurnal $NO_x$ concentration trends show peaks correlated with morning and evening commuter traffic. $NO_2$ concentrations increase steadily after the morning NO peak and remain relatively high until after midnight. This phenomenon is attributed to the oxidation of NO to $NO_2$.

The maximum one-hour average and annual average $NO_2$ concentrations measured in the project area are shown on Table 2-9. The one-hour CAAQS for $NO_2$ (0.25 ppm or 470 $\mu g/m^3$) was violated in 1981 at Barstow. The annual average NAAQS and Nevada standard for $NO_2$ is 0.05 ppm (100 $\mu g/m^3$). The annual standard has not been violated in the project area.

## Sulfur Dioxide

Sulfur dioxide ($SO_2$) is primarily a product of coal and fuel oil combustion processes. In the project area, most $SO_2$ emissions result from fuel oil burning sources, such as cement kilns, scattered throughout the county. The maximum $SO_2$ concentrations generally occur near these sources.

The only monitoring data available for sulfur dioxide are the $SO_2$ concentrations measured at Southeast Desert Air Basin, Trona-Market St. The $SO_2$ ambient standards were not equaled or exceeded.

## Particulate Matter

Wind-blown fugitive dust is a major source of ambient particulate concentrations in the project area. The maximum TSP concentrations measured in Barstow, Victorville, Las Vegas, and Henderson for 1981 to 1983 are shown in Table 2-10. Also shown are the number of secondary 24-hour NAAQS exceedances for each site. There were no exceedances of the primary NAAQS or secondary annual NAAQS. The CAAQS for particulates are based on ambient concentrations of fine particulates (particles less than 10 microns in diameter). There are no monitoring data available in the project area for comparison to the new California standards.

## Lead

Ambient concentrations of lead are primarily the result of lead additives in automobile fuel. Lead is measured as a particulate pollutant in the same manner as TSP or sulfates. The CAAQS for a 30-day averaging period is 1.5 $\mu g/m^3$, identical to the calendar quarter NAAQS and Nevada state standard.

The maximum measured suspended lead concentrations for 1981-1983 measured at Barstow, Victorville, and Las Vegas were below regulated standards. The maximum calendar quarter mean suspended lead concentration in the project area was 1.29 $\mu g/m^3$ in Las Vegas. The measured suspended lead concentrations at Barstow and Victorville were well below the standard (1.5 $\mu g/m^3$).

## Sulfate

Suspended particulates containing sulfate ions ($SO_4$) include both manmade and natural sources. Sulfates can result from the oxidation of $SO_2$, but they are also natural components of soils.

The maximum measured 24-hour sulfate concentrations measured at Barstow and Victorville from 1981 to 1983 indicate no violations of the $SO_4$ CAAQS. There are no sulfate data available for Clark County. There is no national standard for sulfates.

## Nitrates

Nitrate ($NO_3$) concentrations have been measured at Barstow and Victorville, but there are no data available for the Nevada portion of the project area. The maximum 24-hour concentration measured during 1981-1983 is 27.9 $\mu g/m^3$ at the Victorville monitoring site. There are no Federal or state standards for nitrates.

## IMPACT ASSESSMENT/MITIGATION PLANNING

This section presents a discussion of the emissions attributable to construction and operation activities and the potential air quality impacts associated with the proposed Mead/McCullough-Victorville/Adelanto 500kV transmission line.

Emission sources during construction will be associated with the following activities:

- Access road construction
- Clearing right-of-way and tower sites
- Installing foundations and towers (including construction yards and batch plants)
- Assembling and erecting towers
- Stringing, tensioning, and clipping conductors
- Installing of counterpoise
- Clean-up and restoration

These activities result in temporary land disturbances and require the operation of miscellaneous heavy-duty mobile diesel-powered construction equipment.

Emission sources during operation are expected to include maintenance vehicle exhausts, emergency maintenance vehicle and equipment exhausts, and high voltage transmission line ozone and nitrogen oxides generation.

### Effects of Construction

Construction activities could occur on a six days per week, eight hours per day schedule over a period of approximately 24 months. The construction equipment to be used during the various phases of construction is described in the Project Description section. Emissions during construction would be associated primarily with fugitive dust and exhaust from gasoline and diesel-fired construction equipment.

Construction activities would result in temporary emissions increases at localized areas as construction proceeds along the approximately 200-mile-long transmission line route over a period of about 24 months. Fugitive dust emissions would be mitigated using water sprays. Criteria pollutant emissions would be minimized through conformance with existing tailpipe exhaust standards for applicable equipment. Proper maintenance of construction equipment and vehicles would help minimize emissions. Consequently, no long-term significant impacts on air quality would occur.

## Effects of Operation

Operation activities would occur throughout the life of the proposed transmission line project. These activities include: transmission line inspection performed on a regular basis, maintenance and emergency maintenance performed as needed, and operation of the transmission line. Emissions during operation would be primarily associated with airborne dust from unpaved access routes and repair crew vehicle traffic. Small amounts of ozone and nitrogen oxides would be generated from the high voltage line. Emissions associated with the operation phase should be minimal and would not have a significant impact on regional air quality. The emissions associated with the operation of high voltage transmission lines, even during worst-case conditions, have been shown to be relatively small (Droppo 1979). Criteria pollutant emissions would be minimized through conformance with existing tailpipe exhaust standards for applicable equipment. Proper maintenance of construction equipment and vehicles would also help minimize emissions.

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TABLES

TABLE 2-1
WIND FREQUENCY DISTRIBUTION
(Frequency in Percent of Total Observations)

Edwards Air Force Base
1968-1970

| Wind Sector | Wind Speed Class (mps) .76 to 2.00 | 2.01 to 3.00 | 3.01 to 4.00 | 4.01 to 5.00 | 5.01 to 7.00 | 7.01 to 10.00 | 10.1 to 15.00 | Greater Than 15.00 | Total | Mean Speed |
|---|---|---|---|---|---|---|---|---|---|---|
| NNE | 2.30 | 1.13 | .70 | .24 | .16 | .09 | .03 | 0.00 | 4.65 | 2.22 |
| NE | 1.95 | .67 | .36 | .21 | .26 | .14 | .06 | 0.00 | 3.65 | 2.46 |
| ENE | 1.40 | .51 | .41 | .24 | .48 | .21 | .05 | 0.00 | 3.29 | 2.98 |
| E | 1.14 | .42 | .28 | .14 | .35 | .18 | .02 | 0.00 | 2.54 | 2.93 |
| ESE | .86 | .24 | .18 | .07 | .06 | .03 | .00 | 0.00 | 1.44 | 2.09 |
| SE | .75 | .18 | .09 | .04 | .05 | .02 | .02 | 0.00 | 1.14 | 1.97 |
| SSE | .71 | .26 | .10 | .04 | .02 | .02 | .00 | 0.00 | 1.16 | 1.88 |
| S | 1.22 | .51 | .34 | .10 | .05 | .02 | .00 | 0.00 | 2.24 | 2.01 |
| SSW | 1.93 | 1.29 | 1.40 | .87 | .53 | .16 | .05 | 0.00 | 6.23 | 2.91 |
| SW | 3.06 | 2.66 | 3.14 | 2.69 | 3.07 | 2.08 | .71 | 0.00 | 17.40 | 4.24 |
| WSW | 3.06 | 1.94 | 2.35 | 2.55 | 5.34 | 4.71 | 1.08 | 0.00 | 21.03 | 5.13 |
| W | 3.27 | 1.28 | 1.07 | 1.35 | 3.03 | 2.81 | .71 | .01 | 13.54 | 4.76 |
| WNW | 3.36 | 1.41 | .49 | .43 | 1.29 | 1.75 | 1.19 | .05 | 9.95 | 4.65 |
| NW | 3.09 | .98 | .32 | .25 | .52 | .85 | .50 | .01 | 6.52 | 3.61 |
| NNW | 2.03 | .36 | .17 | .06 | .08 | .07 | .01 | 0.00 | 2.79 | 1.77 |
| N | 1.64 | .43 | .21 | .06 | .05 | .02 | .00 | 0.00 | 2.41 | 1.71 |
| CALM (5.75 mps) | | | | | | | | 0.00 | | |
| TOTAL | 31.76 | 14.26 | 11.61 | 9.356 | 15.34 | 13.15 | 4.45 | 0.08 | 100.00 | 3.92 |

Source: National Weather Service, summary of hourly surface data.

TABLE 2-1
WIND FREQUENCY DISTRIBUTION
(Frequency in Percent of Total Observations)

Eielson Air Force Base
1963-1970

| Wind Sector | Wind Speed (Knots (mph)) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | .16 to 2.00 | 2.01 to 3.00 | 3.01 to 4.00 | 4.01 to 5.00 | 5.01 to 7.00 | 7.01 to 10.00 | 10.01 to 13.00 | Greater Than 13.00 | Total | Mean Speed |
| NNE | 2.30 | 1.11 | .70 | .25 | .16 | .03 | .00 | 0.00 | 4.55 | 2.32 |
| NE | 1.95 | .97 | .36 | .15 | .06 | .01 | .00 | 0.00 | 3.50 | 2.25 |
| ENE | 1.00 | .57 | .19 | .07 | .04 | .02 | .00 | 0.00 | 2.29 | 2.38 |
| E | 1.14 | .38 | .05 | .04 | .01 | .01 | .00 | 0.00 | 2.54 | 2.14 |
| ESE | .86 | .25 | .14 | .07 | .05 | .00 | .00 | 0.00 | 1.48 | 2.00 |
| SE | .75 | .11 | .04 | .00 | .02 | .00 | .00 | 0.00 | 1.11 | 1.87 |
| SSE | .17 | .05 | .01 | .00 | .00 | .00 | .00 | 0.00 | 1.16 | 1.86 |
| S | 1.25 | .37 | .12 | .02 | .00 | .00 | .00 | 0.00 | 1.76 | 1.85 |
| SSW | 1.30 | 1.29 | 1.40 | .18 | .36 | .00 | .00 | 0.00 | 4.53 | 2.91 |
| SW | 1.05 | 1.66 | 1.76 | 1.52 | 1.02 | .11 | .00 | 0.00 | 7.12 | 4.23 |
| WSW | 1.25 | 1.06 | 2.36 | 2.32 | 2.39 | 1.06 | .00 | 0.00 | 10.43 | 5.13 |
| W | 0.77 | .35 | 1.35 | 1.75 | 3.02 | 1.35 | .00 | 0.00 | 8.59 | 6.56 |
| WNW | 1.30 | 1.81 | .52 | 1.17 | 2.34 | .52 | .00 | 0.00 | 8.67 | 6.05 |
| NW | 2.04 | .90 | .34 | .25 | .52 | .25 | .00 | 0.00 | 5.32 | 3.87 |
| NNW | 2.30 | .11 | .49 | .10 | .08 | .00 | .00 | 0.00 | 2.79 | 2.22 |
| N | 1.60 | .19 | .07 | .00 | .00 | .00 | .00 | 0.00 | 2.81 | 1.71 |
| CALM (5.17) and | | | | | | | | 0.00 | | |
| TOTAL | 31.75 | 14.34 | 11.01 | 7.35 | 12.34 | 15.34 | 12.15 | 0.00 | 100.00 | 3.91 |

Source: National Weather Service, summary of hourly surface data.

TABLE 2-2
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED
(From Hourly Observations)

Daggett, California
1955-1964

| Wind Sector | Wind Speed Class (knots) 1-3 | 4-6 | 7-10 | 11-16 | 17-21 | 21 | % | Mean Wind Speed (knots) |
|---|---|---|---|---|---|---|---|---|
| N | 0.1 | 0.6 | 0.5 | 0.2 | 0.0 | 0.0 | 1.4 | 7.5 |
| NNE | 0.1 | 0.4 | 0.4 | 0.2 | 0.1 | 0.0 | 1.2 | 8.5 |
| NE | 0.1 | 1.0 | 1.0 | 0.2 | 0.0 | | 2.4 | 7.4 |
| ENE | 0.1 | 0.7 | 0.9 | 0.3 | 0.0 | 0.0 | 1.9 | 7.7 |
| E | 0.1 | 1.3 | 1.6 | 0.6 | 0.1 | 0.0 | 3.7 | 8.0 |
| ESE | 0.1 | 0.7 | 0.7 | 0.3 | 0.1 | 0.0 | 1.9 | 8.1 |
| SE | 0.1 | 0.8 | 0.4 | 0.1 | 0.0 | 0.0 | 1.4 | 6.7 |
| SSE | 0.0 | 0.3 | 0.1 | 0.0 | 0.0 | 0.0 | 0.5 | 6.8 |
| S | 0.0 | 0.3 | 0.1 | 0.0 | 0.0 | 0.0 | 0.6 | 6.9 |
| SSW | 0.0 | 0.2 | 0.1 | 0.1 | 0.1 | 0.0 | 0.5 | 9.9 |
| SW | 0.1 | 0.5 | 0.6 | 0.8 | 1.0 | 0.4 | 3.3 | 14.1 |
| WSW | 0.1 | 0.9 | 2.1 | 3.4 | 3.8 | 1.3 | 11.6 | 15.1 |
| W | 0.1 | 2.7 | 8.7 | 6.3 | 3.3 | 1.4 | 22.5 | 12.1 |
| WNW | 0.1 | 3.2 | 11.0 | 8.1 | 2.0 | 0.5 | 24.9 | 10.8 |
| NW | 0.1 | 1.9 | 4.2 | 2.2 | 0.2 | 0.0 | 8.6 | 9.2 |
| NNW | 0.1 | 0.6 | 0.7 | 0.3 | 0.0 | 0.0 | 1.7 | 8.0 |
| CALM | | | | | | | 11.8 | |
| TOTAL | 1.3 | 16.0 | 33.4 | 23.0 | 10.8 | 3.7 | 100.0 | 9.8 |

Source: Wind in California, Bulletin No. 185.

TABLE 2-3
WIND DIRECTION FREQUENCY DISTRIBUTION
NIPTON: 6/19/79 - 8/31/79
CADIZ: 7/6/79 - 8/31/79
(Percent)

| Wind Sector | Hour (PST) 0000-0500 | | 0600-1100 | | 1200-1700 | | 1800-2300 | | All Hours | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Nipton | Cadiz | Nipton | Cadiz | Nipton | Cadiz | Nipton | Cadiz | Nipton | Cadiz |
| N | 1.1 | 2.9 | 2.1 | 3.6 | 1.0 | 0.5 | 1.2 | 1.9 | 1.3 | 3.2 |
| NNE | 0.4 | 2.6 | 0.9 | 2.8 | 0.5 | 0.3 | 0.6 | 1.6 | 0.6 | 1.7 |
| NE | 6.1 | 7.0 | 3.6 | 4.8 | 0.5 | 0.9 | 2.6 | 4.4 | 3.2 | 5.3 |
| ENE | 17.7 | 7.7 | 3.7 | 4.8 | 0.7 | 2.5 | 5.3 | 5.3 | 6.7 | 4.8 |
| E | 21.8 | 7.8 | 6.5 | 9.8 | 1.1 | 3.2 | 10.8 | 2.9 | 10.0 | 5.9 |
| ESE | 17.0 | 13.9 | 4.8 | 14.2 | 1.2 | 8.0 | 14.4 | 4.9 | 9.3 | 11.7 |
| SE | 8.9 | 15.5 | 7.5 | 15.4 | 2.6 | 24.4 | 9.8 | 22.2 | 7.2 | 15.8 |
| SSE | 9.2 | 9.9 | 10.9 | 7.6 | 13.5 | 16.5 | 14.1 | 14.6 | 11.9 | 11.7 |
| S | 10.7 | 5.6 | 11.4 | 5.6 | 13.7 | 14.1 | 11.6 | 11.1 | 11.8 | 7.6 |
| SSW | 3.4 | 4.6 | 14.1 | 4.7 | 18.9 | 5.2 | 9.6 | 9.2 | 11.5 | 3.1 |
| SW | 0.9 | 4.5 | 8.7 | 5.8 | 26.6 | 8.0 | 9.1 | 5.4 | 11.5 | 5.6 |
| WSW | 0.3 | 5.1 | 7.0 | 6.1 | 6.6 | 6.1 | 4.7 | 6.0 | 4.7 | 4.5 |
| W | 0.3 | 3.1 | 7.4 | 3.9 | 5.5 | 2.1 | 2.3 | 3.7 | 3.8 | 6.1 |
| WNW | 0.8 | 4.7 | 6.8 | 3.3 | 4.4 | 3.0 | 0.8 | 3.4 | 3.2 | 7.1 |
| NW | 0.6 | 3.3 | 2.9 | 2.9 | 2.8 | 1.3 | 2.4 | 1.3 | 2.2 | 2.6 |
| NNW | 0.3 | 2.0 | 0.9 | 1.7 | 0.2 | 1.8 | 0.9 | 1.1 | 0.6 | 1.3 |
| CALM | | 1.9 | | 3.0 | | 2.2 | | 1.3 | | 2.3 |

Source: Onsite Monitoring Program - Southern California Edison Company.

TABLE 2-4
MEAN TEMPERATURE
(degrees F)

| Location | No. of Years Recorded | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Barstow | 36 | 45.9 | 50.1 | 55.7 | 62.4 | 68.9 | 78.0 | 84.4 | 82.6 | 75.6 | 64.7 | 53.6 | 46.3 | 64.0 |
| Daggett | 17 | 46.8 | 51.4 | 56.5 | 56.2 | 72.1 | 80.4 | 87.2 | 85.0 | 80.1 | 68.1 | 55.0 | 48.2 | 66.3 |
| Las Vegas | 30 | 44.2 | 49.1 | 54.8 | 63.8 | 73.3 | 82.3 | 89.6 | 87.4 | 80.1 | 67.1 | 53.3 | 45.2 | 65.8 |
| Yucca Grove | 21 | 39.3 | 42.9 | 48.0 | 55.2 | 63.5 | 71.4 | 79.7 | 78.0 | 71.0 | 59.8 | 49.0 | 42.7 | 58.5 |
| Victorville | 21 | 42.4 | 45.6 | 50.4 | 57.8 | 64.0 | 71.5 | 78.6 | 77.4 | 71.7 | 60.9 | 49.2 | 43.9 | 59.5 |

Source: Climatic Summary of the United States, California.
Climatography of the United States, No. 86-4.
Local Climatological Data - Las Vegas, Nevada.

TABLE 2-5
PRECIPITATION

| Location | No. of Years Recorded | Average Precipitation (inches) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | Annual |
| Baker | 7 | 0.47 | 0.22 | 0.29 | 0.19 | 0.11 | 0.01 | 0.38 | 0.31 | 0.13 | 0.38 | 0.36 | 0.13 | 2.98 |
| Barstow | 48 | 0.80 | 0.54 | 0.64 | 0.19 | 0.08 | 0.09 | 0.26 | 0.23 | 0.20 | 0.34 | 0.32 | 0.58 | 4.27 |
| Daggett | 17 | 0.60 | 0.33 | 0.30 | 0.21 | 0.03 | NA[a] | 0.31 | 0.50 | 0.33 | 0.19 | 0.32 | 0.48 | 3.60 |
| Las Vegas | 30 | 0.45 | 0.30 | 0.33 | 0.27 | 0.10 | 0.09 | 0.44 | 0.49 | 0.27 | 0.22 | 0.43 | 0.37 | 3.76 |
| Victorville | 22 | 1.17 | 0.86 | 0.85 | 0.42 | 0.06 | NA | 0.06 | 0.13 | 0.12 | 0.29 | 0.52 | 0.93 | 5.41 |

[a] NA = Data not available.

Source: Climatography of the United States, No. 86-4.
Local Climatological Data - Las Vegas, Nevada.

TABLE 2-6
AMBIENT AIR QUALITY STANDARDS[a]

| Pollutant | Averaging Time | California Standards[b,c,d] | Nevada Standards[d,e] | National Standards[a] Primary[d,f] | National Standards[a] Secondary[d,g] |
|---|---|---|---|---|---|
| Oxidant (Ozone) | 1-hour | 0.10 ppm (200 μg/m3) | 235 μg/m3 (0.12 ppm) | 235 μg/m3 (0.12 ppm) | Same as primary standard |
| Carbon monoxide | 8-hour | 9 ppm (10 mg/m3) | 10 mg/m3 (9 ppm) | 10 mg/m3 (9 ppm) | Same as primary standard |
| | 1-hour | 20 ppm (23 mg/m3) | 40 mg/m3 (35 ppm) | 40 mg/m3 (35 ppm) | Same as primary standard |
| Nitrogen dioxide | Annual average | -- | 100 μg/m3 (0.05 ppm) | 100 μg/m3 (0.05 ppm) | Same as primary standard |
| | 1-hour | 0.25 ppm (470 μg/m3) | -- | -- | -- |
| Sulfur dioxide | Annual average | -- | 80 μg/m3 (0.03 ppm) | 80 μg/m3 (0.03 ppm) | -- |
| | 24-hour | 0.05 ppm[h] (131 μg/m3) | 365 μg/m3 (0.14 ppm) | 365 μg/m3 (0.14 ppm) | -- |
| | 3-hour | -- | 1300 μg/m3 (0.5 ppm) | -- | 1300 μg/m3 (0.5 ppm) |
| | 1-hour | 0.25 ppm (655 μg/m3) | -- | -- | -- |
| Suspended particulate matter | Annual geometric mean | -- | 75 μg/m3 | 75 μg/m3 | 60 μg/m3[i] |
| | 24-hour | -- | 150 μg/m3 | 260 μg/m3 | 150 μg/m3 |
| Fine particulate matter ( 10 um) | 24-hour | 50 μg/m3 | -- | -- | -- |
| | Annual geometric mean | 30 μg/m3 | -- | -- | -- |
| Sulfates | 24-hour | 25 μg/m3 | -- | -- | -- |

Table 2-6 (continued)
Ambient Air Quality Standards[a]

| Pollutant | Averaging Time | California Standards[b,c,d] | Nevada Standards[d,e] | National Standards[a] Primary[d,f] | National Standards[a] Secondary[d,g] |
|---|---|---|---|---|---|
| Lead | 30-day | 1.5 μg/m$^3$ | -- | -- | -- |
| | Calendar quarter | -- | 1.5 μg/m$^3$ | 1.5 μg/m$^3$ | Same as primary standard |
| Hydrogen sulfide | 1-hour | 0.03 ppm (42 μg/m$^3$) | -- | -- | -- |
| Vinyl Chloride | 24-hour | 0.010 ppm (26 μg/m$^3$) | -- | -- | -- |
| Ethylene | 8-hour | 0.1 ppm | -- | -- | -- |
| | 1-hour | 0.5 ppm | -- | -- | -- |
| Visibility reducing particles | 1 observation | In sufficient amount to reduce the prevailing visibility to less than 10 miles when the relative humidity is less than 70 percent[j] | In sufficient amount to reduce the prevailing visibility to less than 10 miles when the relative humidity is less than 70 percent[j] | -- | -- |

[a] National standards, other than those based on annual averages or annual geometric means, are not to be exceeded more than once per year.
[b] Standards from California Air Resources Board (1984).
[c] California standards are values that are not to be equaled or exceeded.
[d] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 mm of Hg (1,013.2 millibars); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
[e] Nevada standards are values that should not be exceeded.
[f] National Primary Standards: The level of air quality necessary, with an adequate margin of safety, to protect public health.
[g] National Secondary Standards: The level of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
[h] 0.05 ppm (131 μg/m$^3$) (conductimetric) in the presence of oxidant in excess of state 1-hour standard or in presence of particulates in excess of state 24-hour standard (established June 29, 1977).
[i] For guidance to achieve 24-hour standard.
[j] Prevailing visibility is defined as the greatest visibility which is attained or surpassed around at least half of the horizon circle, but not necessarily in continuous sectors.

TABLE 2-7
OXIDANT CONCENTRATIONS AND EXCEEDANCES

Maximum Measured 1-Hour Oxidant Concentrations
in Project Area
(concentrations in ppm)

| Year | Monitoring Site: Barstow | Victorville-Fairgrounds | Las Vegas | Henderson |
|---|---|---|---|---|
| 1981 | 0.16 | 0.21 | 0.113 | 0.148 |
| 1982 | 0.16[a] | 0.20 | 0.114 | 0.141 |
| 1983 | 0.15 | 0.23 | 0.138 | 0.120 |

Number of Hours and Calendar Days of Oxidant
Standards Exceedances in Project Area

| Standard/Year | Barstow Hours | Barstow Days | Victorville-Fairgrounds Hours | Victorville-Fairgrounds Days | Las Vegas Hours | Las Vegas Days | Henderson Hours | Henderson Days |
|---|---|---|---|---|---|---|---|---|
| CAAQS (0.10 ppm) | | | | | | | | |
| 1981 | 163 | 50 | 459 | 104 | -- | --[b] | -- | --[b] |
| 1982 | 58 | 25 | 367 | 85 | -- | --[b] | -- | --[b] |
| 1983 | 318 | 70 | 505 | 91 | -- | --[b] | -- | --[b] |
| NAAQS (0.12 ppm) | | | | | | | | |
| 1981 | 20 | 13 | 87 | 39 | 0 | 0 | 18 | 14 |
| 1982 | 19 | 12 | 118 | 35 | 0 | 0 | 4 | 4 |
| 1983 | 9 | 5 | 60 | 21 | 4 | 2 | 0 | 0 |

[a] Statistics do not meet California ARB criteria for representativeness.
[b] Standard does not exist in Nevada.

TABLE 2-7
OXIDANT CONCENTRATIONS AND EXCEEDANCES

Maximum Measured 1-Hour Oxidant Concentrations
in Packed Area
(concentrations in ppm)

| Year | Station | Valley Site: Valley-wide Average | Valley Site: Low Value | Valley Site: Exceedances |
|---|---|---|---|---|
| 1981 | 0.15 | 0.2[illegible] | 0.113 | 0.100 |
| 1982 | 0.[illegible] | 0.[illegible] | 0.119 | 0.141 |
| 1983 | 0.15 | 0.22 | 0.124 | 0.120 |

Number of Days and Calendar Days of Oxidant
Stagnation Conditions in Packed Area

| Station/Year | Valley Site: Valley-wide: Days | Valley Site: Valley-wide: Calendar Days | Valley Site: Valley-wide: Exceedance Days | Valley Site: Low Value: Days | Valley Site: Low Value: Calendar Days | Valley Site: Low Value: Exceedance Days | Valley Site: Exceedance: Days | Valley Site: Exceedance: Calendar Days |
|---|---|---|---|---|---|---|---|---|
| CAAQS (0.10 ppm) | | | | | | | | |
| 1981 | 143 | 50 | 809 | 109 | -- | -- | -- | -- |
| 1982 | 38 | 25 | 357 | 36 | -- | -- | -- | -- |
| 1983 | 19 | 10 | 326 | 41 | -- | -- | -- | -- |
| NAAQS (0.12 ppm) | | | | | | | | |
| 1981 | 30 | 14 | 47 | 35 | 0 | 0 | 16 | 14 |
| 1982 | 15 | 12 | 119 | 35 | 0 | 0 | 4 | 4 |
| 1983 | 0 | 2 | 10 | 21 | 4 | 2 | 0 | 2 |

a Statistics do not meet Continuous AIRS criteria for reasons indicated.
b Standard does not apply to Valley.

TABLE 2-8
CARBON MONOXIDE CONCENTRATIONS AND EXCEEDANCES

Maximum Measured CO Concentrations
in Project Area
(concentrations in ppm)

| Averaging Period/ Year | Monitoring Site | | | |
|---|---|---|---|---|
| | Barstow | Victorville-Fairgrounds | Las Vegas | Henderson |
| 1-Hour Average | | | | |
| 1981 | 6.0 | 6.0[a] | 21.1 | NA |
| 1982 | 5.0[a] | 5.0[a] | 14.1 | 7.8 |
| 1983 | 8.0 | NA[b] | 24.0 | 4.7 |
| 8-Hour Average | | | | |
| 1981 | 2.10 | 6.00[a] | 11.4 | --[c] |
| 1982 | 3.30[a] | 3.50[a] | 18.8 | --[c] |
| 1983 | 2.90 | NA | 16.0 | --[c] |

Number of Hours and Calendar Days of
CO Standards Exceedances in Project Area

| 8-Hour NAAQS (9 ppm) | Monitoring Site | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Barstow | | Victorville-Fairgrounds | | Las Vegas | | Henderson | |
| Year | Hours | Days | Hours | Days | Hours | Days | Hours | Days |
| 1981 | 0 | 0 | 0 | 0 | NA | 34 | NA | NA |
| 1982 | 0 | 0 | 0 | 0 | NA | 29 | NA | NA |
| 1983 | 0 | 0 | NA | NA | NA | 35 | NA | NA |

[a] Statistics do not meet California ARB criteria for representativeness.
[b] NA = Data not available.
[c] Data are not collected if the high 1-hour concentration does not exceed 8.7 ppm (10 mg/m$^3$).

TABLE 2-3
CARBON MONOXIDE CONCENTRATIONS AND EXCEEDANCES

Maximum Measured CO Concentrations
at Project Area
(concentrations in ppm)

| Averaging Period/ Year | Monitoring Site: Hawthorne | Vista-Inglewood/Inglewood | Los Angeles | Downtown |
|---|---|---|---|---|
| 1-Hour Average | | | | |
| 1981 | 6.8 | 8.60 | 21.0 | NA |
| 1982 | 5.00 | 3.05 | 14.1 | 7.0 |
| 1983 | 6.0 | NA[b] | 25.0 | 4.7 |
| 8-Hour Average | | | | |
| 1981 | 3.10 | 5.10[a] | 9.4 | --[c] |
| 1982 | 3.300 | 3.500 | 10.3 | --[c] |
| 1983 | 2.90 | NA | 13.0 | --[c] |

Number of Hours and Calendar Days of
CO Standard Exceedances at Project Area

| 8-Hour MAAQS (9 ppm) | Monitoring Site: Hawthorne: Hours | Days | Vista-Inglewood/Inglewood: Hours | Days | Los Angeles: Hours | Days | Downtown: Hours | Days |
|---|---|---|---|---|---|---|---|---|
| Year | | | | | | | | |
| 1981 | 0 | 0 | 0 | 0 | NA | 35 | NA | NA |
| 1982 | 0 | 0 | 0 | 0 | NA | 23 | NA | NA |
| 1983 | 0 | 0 | NA | NA | NA | 35 | NA | NA |

a Statistics do not meet California ARB criteria for "complete" data.
b NA = Data not available.
c Data are not collected in the Downtown area. Concentrations are in parts per million (10 mg/m³).

TABLE 2-9
MAXIMUM MEASURED NITROGEN DIOXIDE CONCENTRATIONS
IN PROJECT AREA

| Averaging Period/ Year | Monitoring Site (Concentrations in ppm) | | |
|---|---|---|---|
| | Barstow | Victorville-Fairgrounds | Las Vegas |
| 1-Hour Average | | | |
| 1981 | 0.30 | 0.00[a] | 0.203 |
| 1982 | 0.20 | 0.12[a] | 0.206 |
| 1983 | 0.15[a] | 0.13 | 0.138 |
| Annual Average | | | |
| 1981 | 0.025 | 0.000[a] | NA[b] |
| 1982 | 0.025 | 0.020[a] | 0.025 |
| 1983 | 0.023[a] | 0.021 | 0.024 |

[a]Statistics do not meet California ARB criteria for representativeness.
[b]NA = Data not available.

TABLE 2-10
PARTICULATE CONCENTRATIONS AND EXCEEDANCES

Maximum Measured Particulate Concentrations
in Project Area
(concentrations in ug/m$^3$)

| Averaging Period/ Year | Monitoring Site | | | |
|---|---|---|---|---|
| | Barstow | Victorville-Fairgrounds | Las Vegas | Henderson |
| 24-Hour Average | | | | |
| 1981 | 300 | 172 | 295 | NA[b] |
| 1982 | 116 | 237 | 267 | 201 |
| 1983 | 87 | 125 | 379 | 673 |
| Annual Geometric Average | | | | |
| 1981 | 70.9 | 73.5 | 95.6 | NA |
| 1982 | 46.0[a] | 59.0[a] | 87.3 | 73.5 |
| 1983 | 64.2[a] | 61.6[a] | 89.6 | 80.0 |

Number of Measured Exceedances and Observations
of 24-Hour PM Standard

| Standard/ Year | Monitoring Site | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Barstow | | Victorville-Fairgrounds | | Las Vegas | | Henderson | |
| | Exc.[c] | Obs.[d] | Exc. | Obs. | Exc. | Obs. | Exc. | Obs. |
| 24-Hour Secondary NAAQS (150 ug/m$^3$) | | | | | | | | |
| 1981 | 2 | 55 | 1 | 61 | NA | NA | NA | NA |
| 1982 | 0 | 21 | 1 | 57 | NA | NA | NA | NA |
| 1983 | 0 | 20 | 0 | 56 | NA | NA | NA | NA |

[a] Statistics do not meet California ARB criteria for representativeness.
[b] NA = Data not available.
[c] Exc. = Exceedances
[d] Obs. = Observations

TABLE 3.10
PARTICULATE CONCENTRATIONS AND CHANGES

Maximum Measured Particulate Concentrations
in Study Area
(micrograms/m³)

| Averaging Period/ Year | Monitoring Site: Fairview | Vineyard | Los Angeles | Hawthorne |
|---|---|---|---|---|
| 24-Hour Average | | | | |
| 1961 | 300 | 175 | 215 | NA[b] |
| 1962 | 115 | 222 | 267 | 301 |
| 1963 | 87 | 175 | 325 | 577 |
| Annual Geometric Average | | | | |
| 1961 | 70.3 | 73.7 | 75.6 | NA |
| 1962 | 56.00 | 73.04 | 87.3 | 75.3 |
| 1963 | 63.23 | 61.60 | 72.4 | 91.0 |

Number of Measured Exceedances and Observations
of 24-Hour Pa Standard

| Standard/ Year | Monitoring Site: Vineyard: Exceed[c] | Vineyard: Obs[d] | Fairview: Exc. | Fairview: Obs. | Los Angeles: Exc. | Los Angeles: Obs. | Hawthorne: Exc. | Hawthorne: Obs. |
|---|---|---|---|---|---|---|---|---|
| 24-Hour Secondary IRA ADS (1.5 log/m³) | | | | | | | | |
| 1961 | 2 | 37 | 1 | 37 | NA | NA | NA | NA |
| 1962 | 0 | 51 | 1 | 37 | NA | NA | NA | NA |
| 1963 | 0 | 20 | 0 | 34 | NA | NA | NA | NA |

a Statistics do not meet California ARB criteria for representativeness.
b NA = Data not available.
c Exc. = Exceedances.
d Obs. = Observations.

# CHAPTER 3
# EARTH RESOURCES

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# CHAPTER 3
# EARTH RESOURCES

This chapter contains the baseline inventory for Earth Resources for the proposed 500kV transmission line from the Mead or McCullough Switching Station in southern Nevada to the Victorville/Adelando area in the southwestern portion of the Mojave Desert in California. Discussions presented in this report include geology, hydrology, soils, and geologic hazards.

## STUDY AREA OVERVIEW

The proposed Mead/McCullough-Victorville/Adelanto Transmission Project lies within the Mojave Desert Physiographic Province of southeastern California and southern Nevada. The Mojave Desert is a wedge-shaped region southeast of the Sierra Nevada batholith and southwest of the Basin and Range Physiographic Province. The region is bounded by the Garlock Fault on the north and northwest, and by the San Andreas Fault on the southwest. The eastern boundary of the Mojave Desert is not well defined but, for the purposes of this report, is considered to be the Colorado River.

The study area is characterized by broad alluviated basins interrupted by isolated north- to northwest-trending mountain ranges. These ranges are generally flanked by alluvial fan complexes that grade into broad alluvial plains of little to no relief. Many of the intermontane valleys are closed drainage basins which contain playas at their lowest elevation.

The predominant types of basement rock in the study area are Precambrian, Paleozoic and Mesozoic intrusive igneous and metamorphic rocks. Other rock types in the region include Paleozoic, Mesozoic and Tertiary volcanic and sedimentary rocks. Most of the alternative transmission line routes traverse areas underlain by unconsolidated Quaternary-age alluvial, eolian and lacustrine (playa) deposits.

The tectonic setting of the western Mojave Desert is characterized by northwest-trending right-lateral faults which commonly offset Quaternary sediments. These faults trend generally parallel to the San Andreas Fault to the southwest. Minor east-west trending faults are present east and northeast of Barstow.

The eastern portion of the study area is seismically much less active than the western portion. With the exception of the Manix and Galway Lake events, only occasional, isolated, relatively small magnitude (less than 5.0 on the Richter Scale) earthquakes have historically occurred in the study area.

Economic mineral deposits are widespread in the study area. These deposits occur almost exclusively within the basement rocks, and include gold, silver, lead, zinc, copper, tungsten, flourite, barite, bentonite, gypsum, borates, talc, and some rare earth elements.

## STUDY PERSONNEL

This study was conducted under the supervision and guidance of Roy H. Patterson, with technical assistance from Robert E. Troutman and Jeff Jeter. Thomas W. Dibblee, who had previously mapped a large portion of the study area, made available to us unpublished geologic maps covering parts of the study area.

Mr. Patterson, a Senior Geologist in Dames & Moore's Los Angeles office, has eight years of experience in geological and geotechnical investigations in support of environmental impact analyses. He has extensive experience in environmental analysis for offshore oil development and was principal geologic investigator for environmental reports for oil development in the eastern and western Santa Barbara Channel and in the offshore Santa Maria Basin and for petrochemical facilities in the Los Angeles Basin. He participated in earth resources impact analyses for transmission lines associated with the Sundesert Nuclear Power Project for Wirth Associates. As geotechnical coordinator for the Belridge Cogeneration Project in Kern County, Mr. Patterson had overall responsibility for preparation of geotechnical, geologic and hydrogeologic aspects of an Application for Certification for a large cogeneration project. This project included route selection studies and impact analysis for a transmission line between the project site and an existing substation. Mr. Patterson is a registered geologist in the State of California and has an M.A. in Geology.

Mr. Troutman, a Staff Geologist in Dames & Moore's Santa Barbara office, has four years of experience in geological and geotechnical investigations in support of environmental impact analyses. Mr. Troutman has experience in environmental analyses for offshore oil development in the Santa Barbara Channel and Santa Maria Basin. In addition, he was a principal investigator for a transmission line project in the Tabuk region of Saudi Arabia and was also involved in the Belridge Cogeneration Project in Kern County. Mr. Troutman has participated in foundation investigations for a solar power plant near Daggett, California and performed an evaluation of potential hazardous waste disposal sites in the Colorado Desert region southeast of the project area.

Mr. Jeter, a recent graduate of Humboldt State University, was raised in the western Mojave Desert in Lancaster and has worked at Edwards Air Force Base immediately west of the project area.

## INVENTORY METHODS

### Data Collection

Compilation of the baseline inventory involved available geologic, hydrologic and soils literature and information. Data sources include published and unpublished reports, maps, and open-file reports of the United States Geological Survey (USGS), Bureau of Land Management (BLM), Soils Conservation Service (SCS); California Division of Mines and Geology (CDMG), Department

of Transportation; Nevada Bureau of Mines and Geology (NBMG); and publications from various scientific periodicals and journals. Representatives of the Federal and state agencies listed above and local governments were contacted as information sources. The geologic map was compiled using numerous sources, including published and unpublished maps from the USGS, CDMG, and NBMG. Data concerning historic seismicity were obtained from available CDMG and NBMG publications. Hydrologic information was obtained from the USGS Water Resources Division.

### Data Compilation

Available geologic maps of portions of the study area at scales of 1:24,000, 1:62,500, 1:125,000, and 1:250,000 were transferred to maps at scales of 1:40,000 and 1:62,500 prior to final compilation at a scale of 1:126,720. The corridor width inventoried for geology and soils was generally two miles. The corridor width inventoried for mineral deposits was six miles.

## INVENTORY RESULTS

### Regional Physiographic Setting

The project study area traverses the Mojave Desert Physiographic Province of southern California and southern Nevada. The Mojave Desert is a wedge-shaped geomorphic province bounded by the Sierra Nevada and Garlock faults on the north, the San Andreas Fault on the southwest, and the Transverse Ranges and Colorado Desert on the south and southeast. The southern and eastern limits of the Mojave Desert are not well defined due to the lack of distinct geomorphic boundaries; however, most investigators recognize the eastern Transverse Ranges and Colorado Desert provinces as the southern and southeastern boundaries. Although some investigators include southernmost Nevada in the Basin and Range Physiographic Province, it is included, for the purposes of this report, in the Mojave Desert Physiographic Province.

The portion of the Mojave Desert that contains the alternative transmission line corridors is dominated by broad alluviated basins between relatively isolated mountain ranges and dissected uplands. The majority of the prominent mountain ranges in the project area trend north to northwest, and rise from less than 1,000 to as much as 4,000 feet above the surrounding lowlands. The average elevation of the study area (along the corridors) ranges from less than 1,500 feet in the central portion to over 3,000 feet in several places in the east-central and eastern portions. Local relief varies from extreme along the flanks of ranges in the central portion of the study area to very low in the alluvial valleys.

The entire study area is characterized by internal drainage, into the Mojave River, Kingston Wash, or one of many dry lakes or playas present in the region. The drainage characteristics of the project study area are discussed in more detail in the regional Surface Water Hydrology section.

## Regional Geologic Setting

The alternative transmission line routes under consideration traverse a variety of geomorphic land forms. These landforms reflect, to a certain degree, the diverse nature of the underlying sediments and rocks that occur within the study area. The stratigraphy of the bedrock/sediment types traversed by the proposed routes is described below followed by a discussion of the geologic structure of the project area.

The geology of the proposed transmission line routes is described in the inventory table at the end of this report, and depicted on the geologic map on file in the Dames & Moore Project Files in Phoenix, Arizona.

## Stratigraphy

Discussion of the stratigraphy of the study area is presented from oldest to youngest, beginning with a description of the consolidated rocks followed by descriptions of the relatively young unconsolidated to semi-consolidated sediments which underlie most of the alternative transmission line routes.

### Consolidated Rocks

Consolidated rocks which outcrop within the transmission line corridors range in age from Precambrian to late Tertiary. Precambrian rocks are primarily metamorphic in origin and outcrop in several areas within the mapped corridors. These rocks are included with the Paleozoic and Mesozoic mapped units (PM series). Precambrian rocks exposed within the study area include gneiss, schist, quartzite and marble.

Relatively few rocks of Paleozoic age have been mapped in the study area. According to Dibblee (1980a), the Paleozoic sequence in the Mojave Desert consists of several thousand feet of slightly metamorphosed sedimentary rocks. These strata occur in the east-central portion of the study area. This sequence thins and becomes progressively more deformed, metamorphosed, and invaded by plutonic rocks toward the western part of the study area.

Rocks of Mesozoic age include marine and nonmarine metasedimentary rocks, metavolcanic rocks, and abundant granitic igneous rocks (Dibblee 1980a). A major portion of the Mojave Desert is floored by granitic intrusives similar in age and composition to the widespread granitic plutons present in the Sierra Nevada. Mesozoic sedimentary and metamorphic rocks are much less common in the study area.

Cenozoic-age strata are abundant in the study area and consist entirely of nonmarine sedimentary and volcanic rocks (Norris and Webb 1976). The sequence of volcanic and sedimentary deposits of early to middle Tertiary age is up to 10,000 feet thick in the study area (Dibblee 1980b). These strata consist primarily of intercalated volcanic, pyroclastic and clastic sedimentary

rocks which accumulated in the irregular eroded surface of the pre-Cenozoic basement rocks. Middle Tertiary strata include terrestrial clastic sediments as well as lacustrine clays (Dibblee 1980b). Late Tertiary rocks are relatively uncommon in the study area, except for Pliocene-age sediments exposed near Baker (Dibblee 1980b).

Quaternary Sediments and Volcanic Rocks

Most of the study area is underlain by semi-consolidated to unconsolidated Quarternary-age sediments. In most places on the geologic map, Quaternary alluvium has been differentiated as older alluvium, alluvium, and young alluvium. Other Quarternary units include dune sand and lacustrine (playa) deposits present beneath the dry lake beds. Older alluvium generally is associated with dissected alluvial fans or pediments while young alluvium has been mapped in the major washes or drainages including the channel of the Mojave River.

Quaternary volcanic rocks are present in the study area southeast of Baker, California (south of Link 10). No volcanic rocks were mapped within the alternative transmission line corridors.

**Structure**

The Mojave Desert is bounded on the northwest and southwest by the Garlock and San Andreas faults. These two major strike-slip faults bound a wedge-shaped structural block commonly referred to as the Mojave Block (Hewett 1954). Deformation within the block during the early to middle Tertiary formed several major roughly east-trending depositional basins in the western Mojave Block (Dibblee 1980c). These basins were the site of volcanic and sedimentary deposition during the early to middle Tertiary. During the late Tertiary, these basins were offset both vertically and laterally along northwest-trending faults in the western and central portions of the Mojave Block (Dibblee 1980c). In most cases, vertical offset appears to have preceded lateral displacements (Norris and Webb 1976). These faults trend roughly parallel to the San Andreas and at a high angle to the Garlock Fault. The more prominent of these include the Lenwood, Helendale, Camprock, Calico and Pisgah faults. Cenozoic sedimentary formations are deformed near these faults into folds that trend more westward than the faults, presumably due to right-lateral drag (Dibblee 1967). Although the northwest-trending faults within the Mojave Block partly bound ranges and valleys, they do not form impressive range fronts as do faults in the Basin and Range Physiographic Province. Vertical displacements on some of these faults show alternating in senses of apparent vertical separation along the fault, suggesting that movement has been predominantly lateral (Dibblee 1961).

Several east-west trending faults have been recognized in the central portion of the study area east and northeast of Barstow. The most prominent of these, the Manix Fault, displays evidence of left slip analogous to the Garlock Fault

to the north. This fault extends from the Calico Fault eastward (across Links 21 and 22) about 25 miles to the mouth of Afton Canyon (south of Link 17). These and other faults in the study area are discussed further in the section entitled Seismotectonic Setting.

The eastern portion of the study area contains little evidence of deformation in late Tertiary and Quaternary time. However, there is abundant evidence of Quarternary volcanic activity in the form of volcanic craters and cinder cones to the southeast of Baker and south of the alternative routes.

## Paleontology

Most of the consolidated rock units exposed along the alternative transmission line routes are igneous or metamorphic in origin and are not fossiliferous. These include widespread occurrences of granitic igneous rocks and gneisses, slates, quartzites and phyllites of metamorphic origin.

Vertebrate mammalian fossils, including horse teeth, have been found in the Barstow Formation of middle Tertiary age in the central portion of the study area (Dibblee 1960). Localities in the Mud Hills have yielded one of the largest vertebrate faunas in North America. These strata are regarded as the type for the Barstouian Stage (Dibblee 1967). The richest fossil beds are generally found in the western portion of the Mud Hills, although some fossil remains are also found in the eastern Mud Hills near Owl, Solomon, and Rainbow canyons. Link 20b between Mileposts 3.0 and 5.3 may overlie such fossiliferous beds of the Barstow Formation. Another known fossil location within the Barstow Formation includes an area along Link 6 between Mileposts 79.7 and 82.0. Fossil mammal remains are also reported from the Barstow Formation in the vicinity of Daggett Ridge area (Dibblee 1970). Link 23 (Mileposts 11.0 to 12.2) and Link 25 (Mileposts 0.8 to 1.9) cross outcrops of the Barstow Formation in the Daggett Ridge area that may be fossiliferous.

Vertebrate mammalian fossils of late Pleistocene age occur within lacustrine deposits of ancient Lake Manix. These sediments are mapped along Link 18 (Mileposts 0.5 to 3.7), Link 19 (Mileposts 0.0 to 0.8), and Link 22 (Mileposts 0.0 to 2.0).

Invertebrate corals, brachiopods, and fusilinids are reported from the limestone of the Bird Hill limestone near Baker Hill. Link 9 between Mileposts 20.8 and 21.7 may cross portions of these sediments.

## Minerals

A wide variety of minerals occur in the Mojave Desert. These can be divided into three groups: metallic minerals, nonmetallic minerals, and rare earth elements. For mineral locations and descriptions refer to Table 3-1.

### Metallic Mineral Deposits

Metallic minerals deposits of the Mojave Desert include gold, silver, copper, lead, zinc, mercury, antimony and tungsten. These deposits were formed during the waning stages of magmatism, as metal-enriched fluids were expelled from a cooling magma and passed through fractures and other open cavities within outer margins of the plutons and surrounding country rock.

### Nonmetallic Minerals

Nonmetallic mineral deposits within the study area include asbestos, barite, borates, zeolite, limestone and marl. Of these, the borate minerals are the most important. Large deposits of borate minerals occur in the Kramer District, located several miles northwest of Boron. The center of these operations is the large open pit mine operated by U.S. Borax and Chemical Corporation, located about 10 miles northwest of Link 38 in the northwestern portion of the study area. The East Kramer deposits are two smaller boratic deposits that occur 1.0 mile and 3.5 miles northwest of Kramer Junction (Link 38, Milepost 4.5). The borate deposits in the area occur within beds of an ancient playa (Dibblee 1967). Borates are used in large volumes by the glass and ceramics industries and by detergent manufacturers in Europe.

### Rare Earth Elements

Rare earth elements found in the study area include cerium, lauthanum, neodymium, thorium and europium. These elements are found in Precambrian rocks of the Clark Mountains. This area is one of the major producers of these elements in the world.

## Seismotectonic Setting

The seismotectonic setting of the project region is dominated by the San Andreas and Garlock faults. The San Andreas Fault extends from the Gulf of California northwestward to Cape Mendocino and forms the principal boundary between the Pacific and North American tectonic plates. The Garlock Fault is a major intraplate fault that extends eastward from its intersection with the San Andreas Fault and displays abundant evidence of left-lateral offset in Holocene time. Both of these faults are capable of generating major to great earthquakes which could result in significant levels of strong ground motion along the proposed transmission line routes.

In addition to these two major active structures, several lesser faults considered to be at least potentially active are present in the central and western portion of the project area. Most if not all of the faults listed in Table 3-2 are capable of generating moderate to large albeit less frequent events which, due to their closer proximity to the transmission line routes,

could result in significant ground motions as well as pose a potential surface fault rupture hazard.

**Significant Faults**

San Andreas Fault - The San Andreas Fault is seismically active and capable of generating earthquakes in excess of Magnitude 8. The distribution of seismic activity along the length of the fault is variable. Some segments have historically generated major or great earthquakes; other segments are characterized by more frequent, smaller magnitude events, and others are currently experiencing aseismic creep. At its closest approach to elements of the proposed project, the fault is about 17 miles southwest of the Adelanto and Victorville switching stations. This portion of the fault ruptured during the 1857 Magnitude ±8 earthquake. Based on extensive studies by Kerry Sieh of the California Institute of Technology, this segment of the fault is inferred to generate major to great earthquakes with an average recurrence interval of between about 145 and 200 years (Sieh 1984).

Garlock Fault - The Garlock Fault extends from its junction with the San Andreas Fault eastward for approximately 150 miles. The fault is characterized by cumulative left slip of up to 30 to 40 miles (Dibblee 1980c) and is considered to be active based on abundant geomorphic evidence including offset stream channels. Seismic activity on the Garlock Fault could result in significant levels of ground motion in the western and central portions of the project area.

Northwest-Trending Faults - A number of northwest-trending faults have been mapped within the Mojave Block. Of these, the Helendale, Calico, Harper, Camprock, Lenwood, Spring, and South Lockhart faults cross one or more of the alternative transmission line links (Table 3-2). These faults are considered to be at least potentially active based on the ages of offset rock units. In addition, photo reconnaissance mapping along some of these faults by Morton et al. (1980) has identified numerous fault-related topographic features suggestive of late Quaternary activity. Dibblee (1961) presented evidence for right-lateral displacements ranging from hundreds of feet up to several miles on the Helendale and other faults. Most, if not all, of these faults may be capable of generating moderate to large magnitude earthquakes within the immediate project area.

Manix Fault - The Manix Fault is an east-west trending fault located about 25 miles east of Barstow, California. The east-west trend of the Manix Fault generally parallels that of the Garlock Fault to the north. The Manix Fault has been historically active and was the source of the 1947 Magnitude 6.2 Manix earthquake. About two inches of left-lateral displacement occurred along the Manix Fault during this event. South of Afton, the Manix Fault offsets Quaternary playa deposits about 10 feet in a vertical sense (Keaton 1977). This suggests that previous events may have contained an oblique or normal component of displacement. Where the western portion of the Manix Fault crosses Link 21 (Milepost 11.7) (Table 3-2), the surface trace of the fault

is readily apparent on aerial photographs. Here, the fault is marked by an abrupt south-facing scarp in older alluvium.

### Historic Seismicity

The central and western portions of the project study area have experienced the effects of moderate to large earthquakes within historic times (post-1850). Earthquakes of Magnitude ±8 in 1857 on the San Andreas Fault and in 1872 on the Sierra Nevada frontal fault system undoubtedly resulted in strong ground motion within the study area. Although there are no known faults within the Mojave Block capable of generating earthquakes of this size, moderate to large (≤ Magnitude 7) events could potentially occur along faults within the block. The two most significant events that have occurred within the study area are the 1947 Manix and 1975 Galway Lake earthquakes. These events are discussed briefly below.

1947 Manix Earthquake - On April 10, 1947, a Magnitude 6.2 earthquake occurred on the Manix Fault east of Barstow, California. The earthquake was accompanied by two inches of left-lateral displacement for a distance of about two miles along the Manix Fault (Buwalda and Richter 1948). The earthquake was felt throughout the study area and as far away as San Diego, Bakersfield, Phoenix, and Las Vegas. Five minutes after the main event an after-shock measuring Magnitude 5.2 occurred followed by about 140 smaller magnitude after-shocks (Keaton 1977).

1975 Galway Lake Earthquake - On May 31, 1975, a Magnitude 5.2 earthquake occurred on a previously unmapped fault in the Galway Lake area south of the study area. The earthquake was accompanied by surface rupture in the form of left stepping en echelon cracks indicative of right-lateral displacement. Surface rupture occurred along an approximately four-mile-long fault segment, which is now referred to as the Galway Lake Fault. Right-lateral displacements ranging between 2 and 5 millimeters were measured along this segment (Beeby and Hill 1975). The Galway Lake Fault trends north to northwest and is at a slightly oblique angle to the more northwesterly trending Emerson Fault which appears to be related to the Camprock Fault to the northwest.

## Hydrology

### Surface Water Hydrology

The study area is characterized by internal drainage, into either the Mojave River or Kingston Wash, or into one of many dry lakes (playas) present in the region. Kingston Wash, in the east-central portion of the study area, drains northward into the Amargosa River which eventually terminates in Death Valley. The Mojave River originates in the San Bernardino Mountains southwest of the study area and flows generally northward through Victorville and then eastward through Barstow. The Mojave River eventually terminates

at Soda Lake (playa) in the central portion of the study area. Most of the Mojave River is characterized by subsurface flow; surface flow generally occurs only in areas where the channel is restricted such as at Lower Narrows near Victorville (Link 33, Milepost 14.6) and in Afton Canyon (south of Link 17). Peak, mean and minimum daily discharges in the Mojave River at these two localities for the years 1960-1978 are listed in Tables 3-3 and 3-4.

Due to the arid climate, all of the drainages within the study area are ephemeral except for portions of the Mojave River as discussed above. Streamflow occurs only in direct response to rainfall, although generally only a small fraction of the total precipitation results in surface runoff due to evapotranspiration and infiltration. According to Maxey (1968), recharge in typical arid basins occurs primarily as a result of infiltration of surface runoff from precipitation over the adjacent upland areas. Occasionally, intense storms generate enough precipitation to result in surface flow that reaches the local base level which, in many cases in the project area, is a dry lake bed. Storms resulting in inundation of the playa surfaces occur only infrequently, perhaps several times per century. The potential for flooding is discussed further in the section entitled Geologic Hazards.

### Ground Water Hydrology

The Mojave Desert region is generally characterized by large ground water basins which are commonly interconnected resulting in interbasinal flow of ground water. In general, shallow ground water is present in the topographically lowest portion of the hydrologic basins which, in the study area, is visually a playa. However, shallow ground water beneath playa lakes is commonly of poor quality due to salt buildup resulting in high levels of total dissolved solids. Shallow ground water also is common beneath the distal portions of alluvial fan complexes (Maxey 1968).

Generally, the most productive aquifers in arid hydrologic basins consist of coarser alluvial deposits as well as fanglomerates beneath the flanks of the basin. Consolidated rock units generally are not found to be productive aquifers unless highly fractured. Fine-grained deposits commonly present in the central portions of desert basins also generally yield only small amounts of water to wells.

## Soils

Due to the large size and remoteness of the study area, detailed soil surveys have not been completed for most of the study area. Data are available covering the extreme western and eastern portions of the study area (USDA, unpublished data; HDR 1981). These data were compared to landforms and mapped geologic units within the remainder of the study area to provide generalized descriptions of the soils inferred to be present within the transmission line corridors.

The primary factors that have influenced soil development in the study area are climate, geology and topography. Low annual precipitation restricts vegetation cover, resulting in limited humus accumulation, and light (soil) colors (HDR 1981). Subsurface accumulation of calcium carbonate is common and often forms a caliche or K horizon. Soils formed on well-drained alluvium may also contain loamy horizons of clay accumulation. Precipitation in the area occurs during short periods of high intensity rainfall. These intensive storms typically result in high runoff from mountainous areas on the alluvial fans, and flooding of alluvial plains and playas. This periodical flooding and evaporation of the floodwaters causes an accumulation of salts, which greatly affect soil development on the alluvial plains and playas.

Topography influences soil formation primarily through its effects upon drainage, runoff and erosion, and secondarily through variations in exposure to the sun and wind (USDA 1951). Topographic features within the study area include mountain ranges, alluvial fans and terraces, and alluvial plains and playas. The steep slopes of the mountainous regions experience rapid to very rapid runoff and commonly high rates of erosion. Soil development is generally stunted because of rapid erosion as well as indurated parent material (bedrock). Lithosols and the lithosolic associations of other soils are characteristic of the steep slopes in mountain areas (USDA 1951). Moderate to slightly sloping alluvial fans and terraces experience medium to slow runoff. These areas are characterized by moderate to slow erosion rates, and may develop deep soils. Planosols are typically found in these areas. Alluvial plains and playas experience very slow to no runoff, and generally no natural erosion. These areas retain water that falls as rain and receive a considerable amount of runoff from adjacent uplands. Hydromorphic and halomorphic intrazonal soils are typically found in these areas (USDA 1951). In many places wind has removed the fine soil particles from old alluvium, creating a surface of "desert pavement." The resulting surface of desert pavement is resistant to water and wind erosion.

The study area contains soils belonging predominantly to the Aridisol and Entisol USDA toxonomic soil orders. Aridisols are characterized by a low content of organic matter in the A horizon and salt or silica accumulations at depth. The two suborders of Aridisols, Argids and Orthids, are based on the presence or absence of an argillic (clay-rich) B horizon (Birkeland 1974). Aridisols are dry more than six months of the year in all horizons. In the study area Aridisols have developed on Quaternary older alluvium, and Quaternary alluvium. Argids dominate the Quaternary older alluvium.

Entisols are young soils that are characteristically lacking developed subsurface horizons. The two suborders of Entisols are Orthents (loamy or clayey) and Psamments (textures of loamy fine sand or coarser). In the study area, Entisols have developed on Quaternary alluvium and young alluvium. Orthents dominate the playas and Psamments occur on young alluvial fans, plains and terraces.

A discussion of the potential for soil erosion is presented in the following section.

## Geologic Hazards

### Soil Erosion

Soils within the alternative study corridors generally coincide with the following sediment types and/or geomorphic surfaces: young alluvium in active stream channels and floodplains, eolian sand deposits, fine-grained playa deposits, undissected alluvial fans and plains, older (dissected) alluvial fans, and consolidated rocks.

The potential for soil erosion is generally low within most of the study area due to the relatively low amount of rainfall, the sediment/soil types present, and the predominantly gentle slopes along the proposed transmission line routes. However, the potential for accelerated soil erosion due to transmission line construction is significant for some of these soil types. Water is generally the most significant erosive agent although wind plays an important role in arid environments such as the study area.

As shown on Figure 4-1 (Map Volume), the following study area soils have the highest potential to experience accelerated erosion due to project activities: young alluvium in active stream channels and floodplains, and areas with eolian sand deposits (sand dunes). The potential for soil erosion in areas underlain by consolidated rocks with little or no soil development is considered to be low to nonexistent. The potential for soil erosion is considered to be moderate to low in all other areas along the proposed transmission line routes. Areas with high potential for soil erosion are noted in the inventory table for geology/hydrology.

### Surface Fault Displacement

The potential for surface faulting along the proposed transmission line route exists at locations where mapped quaternary faults cross the proposed routes. The locations of these crossings are listed in Table 3-2 and are noted in the inventory table. Quaternary faults which cross proposed routes are discussed above in the section entitled Seismotectonic Setting. The frequency with which surface fault rupture occurs along these faults is not known. However, based on evidence such as displaced contacts, geomorphic expression, tectonic setting, and historical seismicity, it is likely that earthquake recurrence intervals on these faults is on the order of hundreds to thousands or even tens of thousands of years. Therefore, the potential for surface fault rupture to occur at any of the fault crossings during the lifetime of the project is considered to be low to extremely low.

### Strong Ground Motion

Due to the proximity of the project area to major active structures such as the San Andreas and Garlock faults and the presence of Quaternary faults in the immediate project area, the alternative transmission line routes will likely be

subjected to significant levels of strong ground motion as a result of seismic activity within the project lifetime. The level of acceleration that can be expected at a given location depends on several factors including distance to the earthquake source, magnitude of the event, subsurface soil conditions, and attenuation of ground motion with distance from the source. Due to the highly variable nature of these factors, levels of acceleration that will result from a given seismic event will vary considerable along the proposed routes. However, based on the distribution of seismogenic faults within and adjacent to the study area, it is apparent that both the likelihood and strength of seismically induced strong ground motions increases from east to west across the study area.

### Soil Liquefaction

In order for liquefaction to occur, loose, granular, saturated soils in the shallow subsurface must be subjected to repeated cycles of strong ground motion. The potential for liquefaction is present in several areas in the western and central portions of the study area where shallow groundwater underlies granular soils within and adjacent to the Mojave River. These areas are noted in the inventory table. Although shallow groundwater is likely present in the vicinity of the playa lakes, these areas are commonly underlain by silts and clays which would not be subject to liquefaction.

### Flooding and Debris Flows

As discussed in the section entitled Surface Water Hydrology, surface water flow generally occurs only in direct response to rainfall from infrequent but intense storms. Such storms commonly trigger flash flooding in channelized drainages that receive runoff from large areas with high levels of precipitation. Drainages subject to flash flooding are most common in dissected alluvial fans adjacent to mountainous terrain. Debris flows most commonly occur on active alluvial fans (Map Units Qya and Qal, Figure 4-1) in response to episodes of intense precipitation. The potential for debris flows is higher in areas downslope from exposures of unconsolidated to semi-consolidated sediments. These areas are noted in the inventory table.

### Slope Instability

No areas with potential serious slope instability problems such as major landslide terrains have been noted in the study area. Most of the alternative transmission line routes traverse areas with slopes less than five percent. Areas with the highest potential for slope instability consist mainly of exposures of weathered bedrock with relatively steep (>10 to 15 percent) slopes. These areas are noted in the inventory table.

### Hydrocompaction (Soil Collapse)

Sediments susceptible to hydrocompaction are loose, low density, and open-textured soils which collapse upon wetting. Soils subject to hydrocompaction are typically found in young alluvial fan deposits above the zone of saturation, generally within a few hundred feet of the ground surface. Subsidence due to hydrocompaction could present a potential hazard to transmission line towers if ponding of water occurs beneath a tower footing underlain by susceptible soils. Subsidence related to hydrocompaction would not present a problem if its occurrence is restricted to areas between towers.

The potential for subsidence due to hydrocompaction is highest in the young alluvial fan deposits. The effects of hydrocompaction would only present a hazard to the transmission route if the soils underlying a support tower were affected. The potential for soil collapse would be evaluated at the location of transmission towers in high susceptibility areas prior to final engineering design and construction, and mitigative measures would be taken as appropriate.

### Expansive Soils

In an arid environment any soil that contains expansive clay minerals will exhibit some shrink-swell potential. The amount of expansion-shrinkage that results is a function of confining stress and moisture content changes as well as percentage of the soil that is composed of expansive clay minerals. Soils containing expansive clay minerals such as montmorillonite are likely present in the vicinity of the playa lake beds as well as the distal portions of alluvial fans.

Expansiveness of soils is usually identified based on soil index tests such as dry density and liquid limit and by consolidation tests where actual soil expansion is measured in a consolidimeter after water flooding. Such tests should be performed on soil samples prior to final design of the transmission line towers.

## IMPACT ASSESSMENT/MITIGATION PLANNING PROCESS

The impact assessment for Earth Resources was designed to determine which features, if any, may potentially be impacted by transmission line construction and/or operation. Of those features inventoried, only current soil erosion patterns and paleontological resources could be shown to potentially be significantly affected by the proposed transmission system. In addition, an analysis of geologic hazards was conducted to determine those hazards that could potentially affect the proposed project.

Based on the results of the impact assessment, mitigation recommendations were made to potentially reduce, where feasible, identified significant impact levels. The overall objective in mitigation planning is to create low residual impacts.

### Impact Assessment Methods

The method for the impact assessment was derived by initially defining impact levels with respect to the impacted resources, namely, soil erosion potential and paleontological resources. Four qualitative terms or combinations thereof are used in this assessment to describe the magnitude of potential impacts: high, moderate, low and negligible. These impact levels are derived by applying a set of specific criteria (i.e., sensitivity, quality, and quantity and duration).

### Soil Erosion Potential

Sensitivity--represents both the inherent value of the resource as well as its susceptibility to changes brought about by this project. With respect to soil erosion, sensitivity is defined in the inventory report as the qualitative estimate of erosion potential (i.e., high, moderate to low, and low).

The soils were classified on the basis of diagnostic morphologic characteristics. In addition to classifying each soil on the basis of diagnostic morphology, broad soil/geomorphic relationships were used to determine erosion potential (Figure 4-1).

Quality and Quantity--Quality represents the existing condition (i.e., disturbed or undisturbed) of the resource. Quantity represents the amount of area disturbed by the project. With respect to erosion, quality and quantity were defined in terms of access levels or amount of disturbance resulting from proposed tower pads, access roads, pulling stations, and splicing sites. The three access levels are defined below:

- Sufficient (existing access is sufficient)

  Existing roads, including paved, improved, or those currently being used for utility right-of-way access will be fully utilized, with no blading or

substantive upgrading required. Approximately 0.25 mile of new road (spur road) construction would be required for every mile of transmission line.

- Upgrade (existing access requires upgrading)

  Existing roads will be utilized but will require substantive upgrading (blading, culvert installation, etc.). Approximately 0.75 mile of new road (spur and centerline) construction would be required for every mile of transmission line.

- New (new access is required)

  Existing roads are insufficient or nonexistent, requiring the construction of totally new access roads. Approximately 1.5 to 2.0 miles of new road (spur and centerline) construction would be required for every mile of transmission line.

Duration--represents the time during which the resource would be affected by the proposed project, either short- or long-term. For the purpose of this assessment, all impacts were assumed to be long-term.

Once the impact criteria were formulated, the impact model was used to predict the various impact levels. Table 3-8 presents the soil erosion impact assessment model with potential impact levels.

### Paleontological Resources

The four impact criteria as they apply to paleontological resources are defined below:

Sensitivity--represents the value or significance of the fossil-bearing strata. In this case, only those areas underlain by fossil-bearing strata with a high or moderate significance level were evaluated with the impact assessment model.

Quality and Quantity--represent the access level or amount of disturbance resulting from the proposed tower pads, access roads, pulling stations, and splicing sites. The three access levels (sufficient, upgrade and new) are defined the same as outlined under soil erosion potential.

Duration--represents the time during which the resource would be affected by the proposed project, which in this case, all impacts are considered long-term.

Once the impact criteria were formulated, the impact model was used to predict the various impact levels. Table 3-9 presents the paleontological resources impact assessment model with potential impact levels.

## Potential Geotechnical Hazards

Results of the inventory portion of this study have shown that some aspects of the geologic environment could affect the proposed steel lattice towers and attached conductors; these are identified as geotechnical hazards to the proposed project.

The purpose of this study was to combine the geotechnical data collected during the inventory portion of this study so that the cumulative effects of the different hazards would be easily recognized.

The nature and extent of the geotechnical hazards considered to be of potential significance to the proposed project are discussed in detail in the baseline inventory report. The following geotechnical features are considered in the hazard analysis:

- Surface Fault Displacement
- Strong Ground Motion
- Soil Liquefaction
- Slope Instability
- Expansive Soils
- Hydrocompaction (Soil Collapse)
- Flooding and Debris Flows

The purpose of this report was to summarize the potential hazards presented by these features. In this regard, the hazards could potentially present either siting or foundation problems, depending on the nature and extent of the hazard. (A siting problem is defined as a geotechnical hazard that could be avoided by proper route selection and/or tower spacing within the proposed corridors. A foundation problem is defined as a geotechnical hazard that could require special tower foundation design which would be developed during the specific tower foundation investigation.)

### Surface Fault Displacement

Owing to the difficulty in designing foundations to accommodate differential movement along faults, active or potentially active fault zones are considered a siting problem. Faults are generally long, linear features with limited width; therefore, most fault traces can be avoided by properly routing and spacing transmission towers within the corridors. Most of the faults traversed by the corridors have dominant right-lateral movement; if this is considered when designing the crossings, the routes can be aligned so that movement will not overextend the transmission lines, causing rupture.

The locations of fault crossings are listed in Table 3-2. Link 22, between Mileposts 12.0 and 14.5, closely parallels the Manix Fault, the trace of which is concealed beneath alluvial deposits. It is recommended that this portion of Link 22 be slightly realigned such that the proposed route crosses the fault at a higher angle.

Strong Ground Motion

Most of the region traversed by the corridors is likely to be subjected to moderate to strong levels of ground motion during seismic events. However, transmission towers are particularly insensitive to primary ground shaking during seismic events. Therefore, no specific design measures to mitigate the effects of strong ground motion are recommended.

Soil Liquefaction

Soils that liquefy during an earthquake may undergo permanent differential displacement and such movements can present significant hazards to towers. Therefore, liquefaction is considered a foundation problem. The potential for liquefaction is present in several areas within the western and central portion of the study area where shallow groundwater may be present along with granular soils. These areas are noted on the inventory table for earth resources. Soil liquefaction potential can be mitigated by designing tower foundations to withstand the effects of liquefaction.

Slope Instability

Potential slope instability conditions are present in only a few areas within the proposed corridors. These areas were noted in the inventory table. Slope instability is considered to be a siting problem due to its localized nature and can be mitigated through selective siting of towers in areas where this problem may exist.

Expansive Soils

Expansive soils may undergo volumetric changes that can produce significant vertical movement. Because of the potential for vertical movements, expansive soils are considered to be a foundation problem. They also are so extensive locally that, in general, they cannot be routed around and are not considered a siting problem.

Hydrocompaction (Soil Collapse)

The potential for hydrocompaction occurs where loose, low density, and open-textured soils may be susceptible to collapse upon wetting. Hydrocompaction may be a potential hazard in areas underlain by young alluvial fan deposits. The potential for soil collapse should be evaluated at the transmission tower locations in high susceptibility areas prior to final engineering design and construction so that mitigative measures can be taken as appropriate.

Flooding and Debris Flow Potential

Flash floods are generally localized and are considered to be a siting problem. Proper route alignment and tower spacing should alleviate this concern.

In areas where gulleys are of substantial width and placement cannot be avoided (i.e., width greater than tower spacing), flash floods could be considered to present foundation problems; however, proper engineering measures can be used to protect tower sites. Areas where flooding and debris flows could potentially occur are noted on the inventory table. Flooding and/or inundation could occur within 100-year floodplains which coincide with young alluvium and playa deposits which have been mapped as part of the baseline inventory (Qya and Ql map units on Figure 4-1).

## Mitigation Planning Methods

The rationale used to develop specific mitigation recommendations is based on potential impacts as predicted in each impact model as well as existing conditions along the alternative corridors. The mitigation recommendations presented herein are designed with realistic constraints in mind (i.e., time, cost, construction). These recommended mitigation measures represent a reasonable attempt to reduce the amount of disturbed area to the greatest extent possible.

Taking into account the generically committed mitigation measures, the following specific mitigation measures are recommended for areas with potentially significant impact levels to soil erosion and paleontological resources. These areas are identified on the Impact Assessment/Mitigation Planning Charts (Tables 3-10 and 3-11).

12. Prior to construction, a geotechnical field review of tower and access road design will be conducted by an appropriately qualified professional to identify site-specific, soil erosion impacts and determine the most effective means of mitigating them. Possible mitigation measures could include minor adjustments in tower and road locations, restricting access during periods of high moisture and utilizing selective biodegradable soil stabilizing agents, etc.

12A. Prior to construction, a field review of tower and access road design and location will be conducted by a qualified professional to identify fossil localities that should not be disturbed. Minor realignment of tower and access road locations may be necessary.

## Results

The potential for soil erosion is illustrated on Figure 4-1 and the results of impact assessment and mitigation planning analysis are presented on

Table 3-10. The results of the impact assessment and mitigation planning for paleontological resources are presented on Table 3-11.

While portions of some transmission line routes may be affected by potential geological hazards, it should be noted that with minor exception, the potential hazards can be mitigated by proper route selection, tower spacing, or foundation design.

## AGENCY CONTACTS

## EARTH RESOURCES (GEOLOGY/HYDROLOGY/SOILS)

| Agency | Date | Type of Contact | Summary |
|---|---|---|---|
| United States Department of Agriculture, Soil Conservation Service (Apple Valley) | | | |
| Jim Earson | 11/20/84 | Meeting | Obtained unpublished soil survey material (Victorville to Barstow area only). |
| USDA, BLM | | | |
| Riverside | | | |
| Bill Collins | 11/21/84 | Meeting | Obtained literature on geology and mineral resources of the Mojave Desert. |
| San Bernardino County Geologist | | | |
| Lou Blanck | 11/20 - 11/21/84 | Meeting | Obtained general geology and slope stability maps for the Mojave Desert. Requested references for maps in study area. |
| California Department of Transportation | | | |
| Bob Austin | 11/29/84 | Telephone | Requested any information dealing with geohazards along I-15. Was told that CALTRANS uses railroad system and designs for 100-year flood. |

Agency Contacts (continued)
Earth Resources (Geology/Hydrology/Soils)

| Agency | Date | Type of Contact | Summary |
|---|---|---|---|
| California Department of Transportation | | | |
| Tim Griffin (District Drainage Engineer) | 11/24/84 | Telephone | Requested any material or data used in surface runoff calculations for I-15. Will be sent. |
| California Department of Transportation | | | |
| Bob Hott | 12/16/84 | Telephone | Requested specific information regarding magnitude of 100-year flood calculations used in design of I-15. He will look for and call back. |
| Nevada Bureau of Mines and Geology | | | |
| John Bell | 11/20/84 | Telephone | Received information on geologic maps covering the portions of transmission line corridors within Nevada. Mr. Bell also informed us that flood maps are not available for these areas. |
| Thomas W. Dibblee, Jr. (Retired Consulting Geologist) | 11/20/84 | Meeting | Mr. Dibblee referred us to published geologic maps which cover the entire project area southwest of the Baker area. In addition, Mr. Dibblee agreed to provide us with a complete and unpublished geologic map of the Cave Mountain 15-foot quadrangle. |

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TABLES

## TABLE 3-1
## MINES AND/OR MINERAL DEPOSITS IN PROJECT STUDY AREA*

| Link Number | Description | Minerals/Commodity Present |
|---|---|---|
| 1 | Multiple claims | Gold, Silver, Copper |
| 2 | | Gold, Silver |
| 3 | | Gold |
| 4 | | Gold, Barite |
| 5 | | Gold, Barite |
| 6 | Daisy Mine | (?) |
| 7 | Alvord Mine | Gold |
| 8 | Shaft | |
| 9 | Multiple claims | |
| 10 | | Copper |
| 11 | Multiple claims | Talc and Tungsten |
| 12 | | Talc, Copper |
| 13 | | Gold |
| 14 | | Gold |
| 15 | | Copper |
| 16 | Mohawk Mine | Lead, Silver, Zinc |
| 17 | | Lead, Silver, Zinc |
| 18 | Sulfide Queen Mine | Gold, Silver |
| 19 | Birthday Mine | Rare earth elements |
| 20 | Umberci Mine | |
| 21 | State Line Mine | |
| 22 | Shire Gypsum Deposit | |
| 23 | Atkinson Mine | Lead, Silver |
| 24 | Multiple mines | |
| 25 | Telegraph Mine | Gold, Silver |
| 26 | Landing Field Mine | |
| 27 | Pink Lady Mine | Bentonite |
| Area 1 | | High potential for oil and gas |
| Area 2 | | High potential for oil and gas |
| Area 3 | | Rare earth elements |
| Area 4 | | Rare earth elements |
| Area 5 | | Gold, Silver, Zinc |
| Area 6 | | Gold, Silver, Zinc |
| Area 7 | | Gold, Silver, Zinc |

*Includes mines/mineral deposits within a six-mile study corridor.

TABLE 3H1
MINES AND/OR MINERAL DEPOSITS
IN PROJECT STUDY AREA*

| LCM Number | Description | Mineral(s)/Commodity Present |
|---|---|---|
| 1 | Multiple claims | Gold, Silver, Copper |
| 2 | | Gold, Silver |
| 3 | | Gold |
| 4 | | Gold, Barite |
| 5 | | Gold, Barite |
| 6 | Gray Mine | (?) |
| 7 | Mount Mike | Gold |
| 8 | Shah | |
| 9 | Multiple claims | |
| 10 | | Copper |
| 11 | Multiple claims | Tungsten, Tungsten |
| 12 | | Tin, Copper |
| 13 | | Gold |
| 14 | | Gold |
| 15 | | Copper |
| 16 | Mahony Mine | Lead, Silver, Zinc |
| 17 | | Lead, Silver, Zinc |
| 18 | Sullivan Queen Mine | Gold, Silver |
| 19 | Grundy Mine | Rare earth elements |
| 20 | Unknown Mine | |
| 21 | Stately Lane Mine | |
| 22 | Mine Copper Canyon | |
| 23 | Arlington Mine | Lead, Silver |
| 24 | Multiple mines | |
| 25 | Yellowjack Mine | Gold, Silver |
| 26 | Lemming Gold Mine | |
| 27 | Fine Lady Mine | |
| Area 1 | | Geothermal |
| | | High potential for oil and gas |
| Area 2 | | High potential for oil and gas |
| Area 3 | | Rare earth elements |
| Area 4 | | Rare earth elements |
| Area 5 | | Gold, Silver, Zinc |
| Area 6 | | Gold, Silver, Zinc |
| Area 7 | | Lead, Silver, Zinc |

*Includes mines/mineral deposits within a 5-mile study corridor.

TABLE 3-2
ROUTES CROSSED BY QUATERNARY FAULTS

| Fault | Link | Milepost |
|---|---|---|
| State Line | 6 | 2.0 |
| State Line | 5b | 3.6 |
| State Line | 45 | 4.2 |
| Calico | 22 | 21.1 |
| Calico | 23 | 0.0 |
| Calico | 21b | 8.0 |
| Camprock | 23 | 9.8 |
| Harper | 20 | 32.1 |
| Helendale | 24a | 21.5 |
| Helendale | 32 | 4.8 |
| Helendale | 33 | 5.0 |
| Helendale | 27 | 5.8 |
| Lenwood | 25 | 0.5 |
| Lenwood | 24a | 0.6 |
| Lenwood | 25 | 0.7 |
| Lenwood | 24a | 1.1 |
| Manix | 22 | 13.5 |
| Manix | 22 | 8.8 |
| Manix | 21b | 6.1 |
| South Lockhart | 37 | 0.2 |
| South Lockhart | 38 | 0.3 |
| Spring | 42 | 19.8 |
| Spring | 39 | 2.8 |
| Unnamed | 41 | 0.2 |
| Unnamed | 42 | 0.2 |
| Unnamed | 42 | 16.5 |
| Unnamed | 42 | 16.9 |
| Unnamed | 6 | 66.0 |

Note: Fault names as used by Jennings (1975).

TABLE 3-3
DAILY DISCHARGES OF MOJAVE RIVER - LOWER NARROWS

| Water-Year | | Daily Discharge Rate (cubic feet/second) Mean | Peak | Minimum |
|---|---|---|---|---|
| 1960-1961 | | 26.1 | 284 | 8.7 |
| 1 | 2 | 37.0 | 1,760 | 8.7 |
| 2 | 3 | 23.5 | 242 | 11.0 |
| 3 | 4 | 23.6 | 135 | 8.7 |
| 4 | 5 | 23.2 | 100 | 8.1 |
| 5 | 6 | 70.5 | 5,060 | 6.7 |
| 6 | 7 | 103.0 | 6,860 | 10.0 |
| 7 | 8 | 25.9 | 54 | 8.7 |
| 8 | 9 | 402.0 | 21,000 | 14.0 |
| 1969-1970 | | 31.9 | 102 | 9.6 |
| 0 | 1 | 28.3 | 81 | 8.4 |
| 1 | 2 | 31.4 | 1,540 | 10.0 |
| 2 | 3 | 48.0 | 1,420 | 7.9 |
| 3 | 4 | 24.5 | 70 | 7.9 |
| 4 | 5 | 23.0 | 48 | 3.4 |
| 5 | 6 | 27.8 | 200 | 11.0 |
| 6 | 7 | 39.0 | 128 | 14.0 |
| 7 | 8 | 289.0 | 9,700 | 15.0 |

TABLE 3-3

DAILY DISCHARGES OF MOJAVE RIVER - LOWER NARROWS

| Water-Year | | Daily Discharge Rate (cubic feet/second) | | |
|---|---|---|---|---|
| | | Mean | Peak | Minimum |
| 1960-1961 | | | | |
| 1 | 2 | 26.1 | 294 | 0.7 |
| 2 | 3 | 37.0 | 1,760 | 8.7 |
| 3 | 4 | 23.5 | 242 | 11.0 |
| 4 | 5 | 22.6 | 133 | 6.7 |
| 5 | 6 | 23.2 | 100 | 3.1 |
| 6 | 7 | 70.5 | 5,060 | 6.7 |
| 7 | 8 | 103.0 | 6,840 | 10.0 |
| 8 | 9 | 25.7 | 54 | 8.7 |
| 9 | 10 | 509.0 | 21,000 | 14.0 |
| 1961-1962 | | | | |
| 0 | 1 | 31.7 | 102 | 5.6 |
| 1 | 2 | 23.3 | 61 | 3.4 |
| 2 | 3 | 31.6 | 1,700 | 10.0 |
| 3 | 4 | 48.0 | 1,420 | 7.7 |
| 4 | 5 | 24.5 | 70 | 7.3 |
| 5 | 6 | 23.0 | 40 | 3.4 |
| 6 | 7 | 27.0 | 200 | 11.0 |
| 7 | 8 | 32.0 | 124 | 14.0 |
| 8 | 9 | 289.0 | 9,700 | 13.0 |

TABLE 3-4
DAILY DISCHARGES OF MOJAVE RIVER - AFTON CANYON

| Water-Year | Discharge Rate (cubic feet/second) Mean Daily Discharge | Peak Daily Discharge | Minimum Daily Discharge |
|---|---|---|---|
| 1960-1961 | 0.92 | 20.0 | 0.0 |
| 1 2 | 0.78 | 4.6 | 0.0 |
| 2 3 | 1.04 | 61.0 | 0.0 |
| 3 4 | 0.74 | 3.6 | 0.0 |
| 4 5 | 0.78 | 9.1 | 0.0 |
| 5 6 | 6.60 | 1.170 | 0.0 |
| 6 7 | 2.02 | 403.0 | 0.0 |
| 7 8 | 0.49 | 13.0 | 0.0 |
| 8 9 | 100.00 | 9,500 | 0.0 |
| 9 1970 | 0.75 | 3.2 | 0.0 |
| 1970-1971 | 0.50 | 1.6 | 0.0 |
| 1 2 | 0.82 | 139.0 | 0.0 |
| 2 3 | 0.43 | 3.9 | 0.0 |
| 3 4 | 0.60 | 33.0 | 0.0 |
| 4 5 | 0.22 | 1.0 | 0.0 |
| 5 6 | 0.41 | 79.0 | 0.0 |
| 6 7 | 1.24 | 156.0 | 0.0 |
| 7 8 | 64.6 | 5,870 | 0.14 |

TABLE 3-5
INVENTORY OF GEOLOGIC RESOURCES

| Link No. | Length | Mileposts Begin | Mileposts End | Description | |
|---|---|---|---|---|---|
| 0 | 13.5 | 0.0 | 13.5 | Sediment/ Rock Types: | Alluvium adjacent to Eldorado Dry Lake Bed. |
| | | | | Geologic Hazards: | Corridor crosses wash at Mile-post 2.5. Possible shallow groundwater near Eldorado Dry Lake. |
| 1 | 16.6 | 0.0 | 7.2 | Sediment/ Rock Types: | Alluvium |
| | | | | Geologic Hazards: | None |
| | | 7.2 | 10.6 | Sediment/ Rock Types: | Tertiary volcanic and Pre-cambrian (metamorphic?) rocks. |
| | | | | Geologic Hazards: | Slope instability. |
| | | 10.6 | 16.6 | Sediment/ Rock Types: | Alluvium with outcrops of Precambrian and Paleozoic sedimentary and metamorphic rocks. |
| | | | | Geologic Hazards: | None |
| 2 | 6.5 | 0.0 | 4.5 | Sediment/ Rock Types: | Alluvium and playa deposits of Roach Lake (from Mile-posts 2.5 to 3.0). |
| | | | | Geologic Hazards: | Possible inundation along edge of Roach Lake from infrequent intense storms; shallow ground-water. |

TABLE 3-5
INVENTORY OF GEOLOGIC RESOURCES

| Link Feature | Length | Milepost Begin | Milepost End | | Description |
|---|---|---|---|---|---|
| 0 | 13.5 | 0.0 | 13.5 | Sediment/ Rock Types: | Alluvium adjacent to Colorado Dry Lake Bed. |
| | | | | Geologic Hazards: | Corridor crosses wash at Milepost 2.5. Possible shallow groundwater near Colorado Dry Lake. |
| 1 | 18.5 | 0.0 | 7.5 | Sediment/ Rock Types: | Alluvium |
| | | | | Geologic Hazards: | None |
| | | 7.5 | 10.5 | Sediment/ Rock Types: | Tertiary volcanic and Precambrian (metamorphic?) rocks |
| | | | | Geologic Hazards: | Tuffa instability. |
| | | 10.5 | 18.5 | Sediment/ Rock Types: | Alluvium with outcrops of Precambrian and Paleozoic sedimentary and metamorphic rocks |
| | | | | Geologic Hazards: | None |
| 2 | 8.5 | 0.0 | 8.5 | Sediment/ Rock Types: | Alluvium and playa deposits of Coyote Lake. Tiro's Milepost 2.5 to 3.5. |
| | | | | Geologic Hazards: | Possible liquefaction along edge of Coyote Lake from infrequent intense storms; shallow groundwater. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Mileposts Begin | Mileposts End | Description | |
|---|---|---|---|---|---|
| 3 | 8.4 | 0.0 | 8.4 | Sediment/ Rock Types: | Alluvium and playa deposits of Roach Lake (from Mileposts 2.0 to 4.8). |
| | | | | Geologic Hazards: | Possible inundation of Roach Lake following infrequent intense storms; shallow groundwater. |
| 4 | 1.9 | 0.0 | 1.9 | Sediment/ Rock Types: | Alluvium. |
| | | | | Geologic Hazards: | Shallow groundwater. |
| 5a | 0.2 | 0.0 | 0.2 | Sediment/ Rock Types: | Alluvium. |
| | | | | Geologic Hazards: | None. |
| 5b | 4.8 | 0.0 | 4.8 | Sediment/ Rock Types: | Alluvium, playa deposits of Ivanpah Lake. |
| | | | | Geologic Hazards: | Possible inundation of playa surface following infrequent intense storms; cross State Line Fault at Milepost 3.6. |
| 5c | 12.3 | 0.0 | 6.8 | Sediment/ Rock Types: | Alluvium, playa deposits of Ivanpah Lake. |
| | | | | Geologic Hazards: | Inundation of playa surface following intense storms. |

Table 1-7 (continued)
Inventory of Geologic Hazards

| Line No. | Length | Minerals Below | Minerals Coal | Description |
|---|---|---|---|---|
| 3 | 8.4 | 0.0 | 2.4 | Sediment/ Rock Types: Alluvium and plain deposits in Tooele and Utah Valleys 2.0 to 4.4. |
| | | | | Geologic Hazards: Possible inundation of Rocky Lake following intensent intense storms shallow ground-water. |
| 4 | 1.2 | 0.0 | 1.7 | Sediment/ Rock Types: Alluvium. |
| | | | | Geologic Hazards: Shallow groundwater. |
| 5a | 0.7 | 0.0 | 0.7 | Sediment/ Rock Types: Alluvium. |
| | | | | Geologic Hazards: None. |
| 5b | 4.3 | 0.0 | 4.8 | Sediment/ Rock Types: Alluvium, plain deposits of Tooele Lake. |
| | | | | Geologic Hazards: Possible inundation of plain surface following intensent intense storms cross State Line Fault at Milepost 3b. |
| 5c | 12.7 | 0.0 | 0.8 | Sediment/ Rock Types: Alluvium, plain deposits of Tooele Lake. |
| | | | | Geologic Hazards: Inundation of plain surface following intense storms. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Mileposts Begin | Mileposts End | Description | |
|---|---|---|---|---|---|
| 5c cont. | | 6.8 | 12.3 | Sediment Rock Types: | Pre-Tertiary sedimentary and metamorphic bedrock units, older alluvium. |
| | | | | Geologic Hazards: | Unstable slopes in bedrock areas, flash flooding in narrow drainage courses. |
| 6 | 83.3 | 0 | 10.1 | Sediment/ Rock Types: | Alluvium and playa deposits (Mileposts 0.0 - 0.5). |
| | | | | Geologic Hazards: | Occasional gullies which may be susceptible to flash floods; State Line Fault crosses route at Milepost 2.0. |
| | | 10.1 | 12.0 | Sediment/ Rock Types: | Precambrian granitic gneiss. |
| | | | | Geologic Hazards: | Slope stability. High potential for soil erosion in drainages between Mileposts 9.0 and 13.5. |
| | | 12.0 | 29.4 | Sediment/ Rock Types: | Alluvium and possibly (undifferentiated) older alluvium. |
| | | | | Geologic Hazards: | High potential for soil erosion in drainages between Mileposts 28.0 and 30.2. |
| | | 29.4 | 31.2 | Sediment/ Rock Types: | Late Tertiary fanglomerate. |
| | | | | Geologic Hazards: | None noted. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Milepost: Begin | Milepost: End | Description |
|---|---|---|---|---|
| 5c cont. | | 5.8 | 13.3 | Sediment/ Rock Types: Pre-Tertiary sedimentary and metamorphic bedrock units, older alluvium. Geologic Hazards: Unstable slopes in bedrock areas, high flooding in narrow drainage courses. |
| 6 | 23.3 | 0. | 10.1 | Sediment/ Rock Types: Alluvium and plain deposits (Milepoints 0.0 - 5.5). Geologic Hazards: Occasional gullies within moderately steep slopes in flood plain. State Line - Salt Creek route at Milepost 2.0. |
| | | 10.1 | 12.0 | Sediment/ Rock Types: Precambrian granitic gneiss. Geologic Hazards: Slope instability. High potential for soil erosion in drainages between Milepoints 9.0 and 12.5. |
| | | 12.0 | 29.8 | Sediment/ Rock Types: Alluvium and pediment (undifferentiated) older alluvium. Geologic Hazards: High potential for soil erosion in drainages between Milepoints 28.0 and 30.2. |
| | | 29.8 | 31.2 | Sediment/ Rock Types: Late Tertiary Conglomerate. Geologic Hazards: None noted. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Mileposts Begin | Mileposts End | Description | |
|---|---|---|---|---|---|
| 6 cont. | | 31.2 | 42.0 | Sediment/ Rock Types: | Undifferentiated alluvium and older alluvium with some isolated areas of intrusive igneous bedrock. |
| | | | | Geologic Hazards: | Debris flow hazard between Mileposts 35.5 and 39.0. |
| | | 42.0 | 50.0 | Sediment/ Rock Types: | Alluvium and several small areas of metamorphic or intrusive igneous bedrock. |
| | | | | Geologic Hazards: | Shallow groundwater near Silver Lake; slope instability (near Milepost 48.8); debris flow potential (Mileposts 42.0 to 44.5, 47.5 to 50.0); flooding. |
| | | 50.0 | 63.8 | Sediment/ Rock Types: | Alluvium with some areas of undifferentiated older alluvium. |
| | | | | Geologic Hazards: | Gullies between Mileposts 56.0 and 59.0 susceptible to flash floods. |
| | | 63.8 | 73.5 | Sediment/ Rock Types: | Alluvium with intrusive igneous bedrock (Mileposts 63.8 to 64.6) and undifferentiated areas of older alluvium. |
| | | | | Geologic Hazards: | Possible Quaternary fault crossing (Milepost 66.0). High potential for soil erosion in drainages near Mileposts 68.8, 71.7 and 72.0. |

Table 3-5 (continued)
Inventory of Geologic Elements

| Link No. | Length | Milepoints Begin | Milepoints End | Description |
|---|---|---|---|---|
| 6 cont. | 11.2 | 42.0 | | Sedimentary Rock Types: Coal-bearing alluvium and clay; alluvium with some isolated areas of intrusive igneous bedrock. |
| | | | | Geologic Hazards: Flash's flow hazard between Milepoints 35.3 and 39.0. |
| | 44.0 | 30.0 | | Sedimentary Rock Types: Alluvium and several small areas of medium-grade or intrusive igneous bedrock. |
| | | | | Geologic Hazards: Shallow ground-water near Silver Lake; slope instability near Milepost 43 (Hazards flow potential (Milepoints 42.0 to 44.5, 47.5 to 50.0); flooding). |
| | 16.0 | 63.4 | | Sedimentary Rock Types: Alluvium with some areas of quaternary-related later alluvium. |
| | | | | Geologic Hazards: Gullies between Mileposts 52.0 and 59.0 susceptible to flash floods. |
| | 11.8 | 73.5 | | Sedimentary Rock Types: Alluvium with intrusive igneous bedrock (Milepoints 63.8 to 69.0) and quaternary-related areas of older alluvium. |
| | | | | Geologic Hazards: Possible flood-prone fault crossing (Milepost 65.0). High potential for soil erosion in drainages near Mileposts 68.5, 71.7 and 72.0. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Mileposts Begin | Mileposts End | Description | |
|---|---|---|---|---|---|
| 6 cont. | | 73.5 | 83.3 | Sediment/ Rock Types: | Highly variable, includes alluvium, dissected older alluvium, undifferentiated Tertiary sedimentary rocks and isolated dune sand deposits (Mileposts 82.0 to 83.0). |
| | | | | Geologic Hazards: | Potential flash floods in gullies, especially in dissected areas southeast of Alford Mountain (Mileposts 79.0 to 83.5); potential debris flow hazard (Mileposts 78.0 to 82.0); active sand dunes. |
| 7 | 13.5 | 0.0 | 13.5 | Sediment/ Rock Types: | Alluvium, older alluvium, Tertiary sedimentary rocks (Mileposts 12.2 to 13.3) and Mesozoic igneous rocks (Mileposts 8.7 to 9.6). |
| | | | | Geologic Hazards: | Flooding in gullies/drainages following intense storms; potential debris flows (Mileposts 0.0 to 4.5, 7.4 to 8.8). |
| 8 | 12.9 | 0.0 | 12.9 | Sediment/ Rock Types: | Alluvium, older alluvium, older lake deposits. |
| | | | | Geologic Hazards: | Flash flood potential, debris flows (Mileposts 0.0 to 3.5). |
| 9 | 25.0 | 0.0 | 7.0 | Sediment/ Rock Types: | Alluvium and Mesozoic granitic rocks. |
| | | | | Geologic Hazards: | Strong potential for flash flooding in Halloran Wash (Mileposts 1.8 to 7.0). |

Table 3-3 (continued)
Inventory of Geologic Features

| Link No. | Length | Milepoints Begin | Milepoints End | Description |
|---|---|---|---|---|
| 6 cont. | | 77.5 | 83.3 | Sediment/ Rock Types: Highly variable, includes siltstone, disarticulated alluvium, coalite, consolidated tertiary sedimentary rocks and partial dune sand deposits (Milepoints 82.0 to 83.0). |
| | | | | Geologic Hazards: Potential flood hazards in coulee, especially in disturbed areas adjacent to Alford Mountain (Milepoints 77.0 to 83.5) potential debris flow hazard (Milepoints 80.0 to 83.0) across sand dunes. |
| 7 | 13.3 | 0.0 | 13.3 | Sediment/ Rock Types: Alluvium, older alluvium, tertiary and sedimentary rocks (Milepoints 12.7 to 13.3) and Milepoints igneous rocks (Milepoints 5.7 to 9.0). |
| | | | | Geologic Hazards: Flooding in coulee floodplains following intense thunderstorm flows (Milepoints 0.0 to 4.5, 7.0 to 8.0). |
| 8 | 12.4 | 0.0 | 12.4 | Sediment/ Rock Types: Alluvium, old alluvium, other loose deposits. |
| | | | | Geologic Hazards: Flash flood potential, debris flows (Milepoints 0.0 to 3.5). |
| 9 | 25.0 | 0.0 | 7.0 | Sediment/ Rock Types: Alluvium and Mesozoic igneous rocks. |
| | | | | Geologic Hazards: Strong potential for flash flooding in Robinson Wash (Milepoints 1.0 to 7.0). |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Mileposts Begin | Mileposts End | Description | |
|---|---|---|---|---|---|
| 9 cont. | | 7.0 | 25.0 | Sediment/ Rock Types: | Alluvium, Tertiary sedimentary rocks (Mileposts 23.5 to 25.0). |
| | | | | Geologic Hazards: | Possible shallow groundwater near Baker (Mileposts 18.5 to 20.0). |
| 10 | 19.9 | 0.0 | 19.9 | Sediment/ Rock Types: | Mesozoic granitic rocks (Mileposts 0.4 to 7.7), alluvium. |
| | | | | Geologic Hazards: | None noted. |
| 11 | 20.5 | 0.0 | 7.0 | Sediment/ Rock Types: | Alluvium, playa deposits of Soda Lake (Mileposts 1.8 to 3.6). |
| | | | | Geologic Hazards: | Inundation of playa following infrequent intense storms; shallow groundwater with associated liquefaction potential (Mileposts 0.0 to 6.0). |
| | | 7.0 | 20.5 | Sediment/ Rock Types: | Mesozoic volcanic and granitic rocks, Tertiary volcanic rocks, alluvium, young alluvium. |
| | | | | Geologic Hazards: | Slope stability in bedrock areas with moderate to high topographic relief; flash flooding potential (Mileposts 9.5 to 11.5); debris flow hazard (Mileposts 13.2 to 16.4). High potential for soil erosion in young alluvium between Mileposts 16.4 and 20.5. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Mileposts Begin | Mileposts End | Description | |
|---|---|---|---|---|---|
| 12 | 4.9 | 0.0 | 4.9 | Sediment/ Rock Types: | Alluvium, playa deposits of Soda Lake (Mileposts 1.1 to 2.3), Tertiary sedimentary rocks. |
| | | | | Geologic Hazards: | Inundation of playa surface following infrequent intense storms; debris flows (Mileposts 4.0 to 4.9). |
| 13 | 10.6 | 0.0 | 10.6 | Sediment/ Rock Types: | Alluvium, young alluvium, older alluvium, Tertiary sedimentary and volcanic rocks. |
| | | | | Geologic Hazards: | Slope instability, minor flash flood potential, debris flow potential (Mileposts 0.0 to 1.2, 6.0 to 7.4). |
| 14 | 4.9 | 0.0 | 4.9 | Sediment/ Rock Types: | Young alluvium. |
| | | | | Geologic Hazards: | Possible shallow groundwater with associated liquefaction potential. High potential for soil erosion in young alluvium between Mileposts 1.8 and 4.8. |
| 15 | 5.0 | 0.0 | 5.0 | Sediment/ Rock Types: | Alluvium, dune sand deposits, older alluvium, granitic bedrock. |
| | | | | Geologic Hazards: | Active sand dunes; slope instability in bedrock exposures with high topographic relief. |

Table 3.5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Milepoints Begin | End | | Description |
|---|---|---|---|---|---|
| 12 | 4.9 | 0.0 | 4.9 | Sediment/ Rock Types: | Alluvium, stony deposits of Soda Lake (Milepoints 1.1 to 2.3). Tertiary sedimentary rocks. |
| | | | | Geologic Hazards: | Potentials of place surface following significant intense storms, debris flows (Milepoints 1.3 to 3.3). |
| 13 | 16.5 | 0.0 | 16.5 | Sediment/ Rock Types: | Alluvium, young alluvium, older alluvium, Tertiary sedimentary and metamorphic rocks. |
| | | | | Geologic Hazards: | Slope instability, minor flash flood potential, debris flow potential (Milepoints 0.0 to 1.3; 9.0 to 7.6). |
| 14 | 4.3 | 0.0 | 4.3 | Sediment/ Rock Types: | Young alluvium. |
| | | | | Geologic Hazards: | Possible shallow groundwater with associated liquefaction potential. High potential for soil erosion in young alluvium between Milepoints 1.3 and 4.3. |
| 15 | 3.0 | 0.0 | 3.0 | Sediment/ Rock Types: | Alluvium, dune sand deposits, older alluvium, granitic bedrock. |
| | | | | Geologic Hazards: | Active sand dunes; slope instability in bedrock exposures with high topographic relief. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Mileposts Begin | Mileposts End | Description | |
|---|---|---|---|---|---|
| 16 | 8.6 | 0.0 | 8.6 | Sediment/ Rock Types: | Alluvium, young alluvium, older alluvium, granitic bedrock. |
| | | | | Geologic Hazards: | Flash flood potential (at Milepost 4.0); slope instability in areas of high relief. |
| 17 | 5.3 | 0.0 | 5.3 | Sediment/ Rock Types: | Alluvium, young alluvium, older alluvium, granitic bedrock. |
| | | | | Geologic Hazards: | Flash flood potential (Mileposts 1.0 to 2.7). |
| 18 | 3.7 | 0.0 | 3.7 | Sediment/ Rock Types: | Older alluvium, includes young alluvium in drainages, as well as fossiliferous lake deposits from ancient Lake Manix. |
| | | | | Geologic Hazards: | Flash flood potential in drainages. |
| 19 | 7.9 | 0.0 | 7.9 | Sediment/ Rock Types: | Alluvium, older alluvium, dune sands. |
| | | | | Geologic Hazards: | Active sand dunes. High potential for soil erosion in young alluvium between Mileposts 2.0 and 3.0, and in drainages between Mileposts 15.5 and 16.2. |

Table 3-3 (continued)
Inventory of Geologic Resources

| Lake No. | Length | Milepost Begin | Milepost End | Description |
|---|---|---|---|---|
| 15 | 8.6 | 0.0 | 8.6 | Sandstone/ Rock Type: Alluvium, young alluvium, older alluvium, granitic bedrock. Geologic Hazard: Flash flood potential (at milepost 3.0); stone instability in areas of high relief. |
| 17 | 5.3 | 0.0 | 5.3 | Sediment/ Rock Type: Alluvium, young alluvium, older alluvium, granitic bedrock. Geologic Hazard: Flash flood potential (milepost 1.0 to 2.7). |
| 18 | 3.7 | 0.0 | 3.7 | Sediment/ Rock Type: Older alluvium, includes young alluvium in drainages, as well as instabilities take deposits from our last Lake Basin. Geologic Hazard: Flash flood potential in drainages. |
| 19 | 7.0 | 0.0 | 7.3 | Sediment/ Rock Type: Alluvium, older alluvium, dune sands. Geologic Hazard: Active sand dunes. High potential for soil erosion in young alluvium between Mileposts 2.0 and 3.0, and in drainages between Mileposts 15.5 and 16.3. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Mileposts Begin | Mileposts End | Description | |
|---|---|---|---|---|---|
| 20a | 21.0 | 0.0 | 11.4 | Sediment/ Rock Types: | Alluvium, young alluvium, dune sands (between Mileposts 4.0 to 7.0), and playa deposits of Coyote Lake (Mileposts 8.4 to 10.3). |
| | | | | Geologic Hazards: | Active sand dunes; innudation of playa surface may occur following intense storms; shallow groundwater. |
| | | 11.4 | 21.0 | Sediment/ Rock Types: | Alluvium with some small areas of older alluvium (near Milepost 13.0); Paleozoic quartzite and hornfelsic metamorphic rocks; possible flash flooding in narrow drainages; bedrock outcrops may potentially have some mineral worth; debris flow potential (Mileposts 19.0 to 21.0). |
| 20b | 17.9 | 0.0 | 9.5 | Sediment/ Rock Types: | Alluvium, older alluvium, tertiary volcanic and sedimentary rocks, and pre-Tertiary intrusive igneous rocks. |
| | | | | Geologic Hazards: | Possible slope instability in bedrock areas. |
| | | 9.5 | 17.9 | Sediment/ Rock Types: | Alluvial deposits. |
| | | | | Geologic Hazards: | Route crosses Harper Fault (Milepost 32.1). |

Table 3-5 (continued)
Inventory of Geologic Resources

| Line No. | Length | Milepost Begin | Milepost End | | Description |
|---|---|---|---|---|---|
| 20b | 21.0 | 0.0 | 11.4 | Sediment/ Rock Types | Alluvium, young alluvium, dune sands between Hippopots 8.0 to 7.0), and plays deposits of Cowsie Lake (Mileposts 3.4 to 10.3). |
| | | | | Geologic Hazards | A-type sand dunes; inundation of playa surface may occur following heavy storms; shallow ground-water. |
| | | 11.4 | 21.0 | Sediment/ Rock Types | Alluvium with some small areas of older alluvium and lake deposits (Mileposts 12.3 to 21.0). |
| 20c | 2.9 | 0.0 | 2.5 | Sediment/ Rock Types | Alluvium, older alluvium, tertiary volcanic and sedimentary rocks, and pre-Tertiary intrusive igneous rocks. |
| | | | | Geologic Hazards | Possible slope instability in bad-rock areas. |
| | | 2.5 | 12.9 | Sediment/ Rock Types | Alluvial deposits. |
| | | | | Geologic Hazards | Fault crosses Harper Valley (Milepost 12.1). |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Mileposts Begin | Mileposts End | Description | |
|---|---|---|---|---|---|
| 21a | 6.0 | 0.0 | 6.0 | Sediment/ Rock Types: | Alluvium, minor areas of older alluvium and Tertiary sedimentary rocks. |
| | | | | Geologic Hazards: | None noted. |
| 21b | 8.0 | 0.0 | 8.0 | Sediment/ Rock Types: | Alluvium, minor aresa of older alluvium and Tertiary sedimentary rocks. |
| | | | | Geologic Hazards: | Route crosses Calico Fault (Milepost 8.0) and Manix Fault (Milepost 6.1). High potential for soil erosion in young alluvium between Mileposts 13.1 and 13.6. |
| 22 | 21.1 | 0.0 | 21.1 | Sediment/ Rock Types: | Older alluvium, alluvium, and younger alluvium including active channel of Mojave River. |
| | | | | Geologic Hazards: | Route coincides roughly with Manix Fault zone between Mileposts 8.8 and 13.5, and crosses Calico Fault at Milepost 21.1 flooding in channel and floodplain of Mojave River; liquefaction associated with strong ground motion and shallow groundwater. High potential for soil erosion in young alluvium at Milepost 8.2 and between Mileposts 19.7 and 21.2. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Milepost Begin | Milepost End | | Description |
|---|---|---|---|---|---|
| 21a | 5.0 | 0.0 | 5.0 | Sediment/ Rock Types: | Alluvium, minor areas of older alluvium and Tertiary sedimentary rocks. |
| | | | | Geologic Hazards: | None noted. |
| 21b | 8.0 | 0.0 | 8.0 | Sediment/ Rock Types: | Alluvium, minor areas of older alluvium and Tertiary sedimentary rocks. |
| | | | | Geologic Hazards: | Route crosses Calico Fault (Milepost 5.0) and Manix Fault (Milepost 6.1). Highly potential for soil erosion occurs along alluvium between Mileposts 1.3 and 12.6. |
| 22 | 21.1 | 0.0 | 21.1 | Sediment/ Rock Types: | Older alluvium, alluvium, and younger alluvium including active and inactive Mojave River. |
| | | | | Geologic Hazards: | Route coincides roughly with Manix Fault and between Milepost 5.0 and 1.5, and crosses Calico Fault at Milepost 21.1. Flooding in arroyos and floodplain of Mojave River liquefaction associated with strong ground motion and flooding groundwater. High potential for soil erosion by wind attention at Mileposts 8.2 and between Mileposts 12.2 and 21.2. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Mileposts Begin | Mileposts End | Description | |
|---|---|---|---|---|---|
| 23 | 13.8 | 0.0 | 2.8 | Sediment/ Rock Types: | Young/active alluvium of Mojave River channel. |
| | | | | Geologic Hazards: | Flooding, erosion due to active stream channel, liquefaction; route crosses Calico Fault at milepost 0.0. |
| | | 2.8 | 13.8 | Sediment/ Rock Types: | Alluvium, older alluvium, Tertiary volcanic and sedimentary rocks. |
| | | | | Geologic Hazards: | Route crosses concealed trace of Camprock Fault (milepost 9.8); possible flash flooding (mileposts 10.0 to 13.8); slope instability in areas of moderate to high topographic relief (mileposts 12.0 to 13.8). High potential for soil erosion in young alluvium between mileposts 0.0 and 3.0. |
| 24a | 27.3 | 0.0 | 18.7 | Sediment/ Rock Types: | Alluvium, older alluvium, younger alluvium; Tertiary volcanics, granitic bedrock (mileposts 6.6 to 6.9). |
| | | | | Geologic Hazards: | Proposed route; two branches of Lenwood Fault cross corridor at Mileposts 0.6 and 1.1; flash flood and debris flows are potential hazards in drainages between Mileposts 10.0 and 18.7. High potential for soil erosion in drainages between Mileposts 5.5 and 7.5, and in young alluvium at Mileposts 10.8, 12.0, 14.5, and between 16.0 and 23.0. |

Table 3-3 (continued)
Inventory of Geologic Resources

| Link No. | Length | Milepost Begin | Milepost End | Description | |
|---|---|---|---|---|---|
| 23 | 13.8 | 0.0 | 2.8 | Sediment/ Rock Types: | Young/active alluvium of Mojave River channel. |
| | | | | Geologic Hazards: | Flooding, erosion due to active stream channel, liquefaction; route crosses Calico Fault at Milepost 0.0. |
| | | 2.8 | 15.8 | Sediment/ Rock Types: | Alluvium, older alluvium, Tertiary volcanic and sedimentary rocks. |
| | | | | Geologic Hazards: | Route crosses concealed trace of Calico Fault (milepost 2.9); possible flood fissility (milepost 10.2 to 15.8); slope instability in areas of moderate to high inter-grade relief (milepost 13.0 to 15.8); high potential for soil erosion in young alluvium between milepost 5.0 and 3.0. |
| 24a | 27.3 | 0.0 | 18.7 | Sediment/ Rock Types: | Alluvium, older alluvium, younger alluvium; Tertiary volcanics, granitic bedrock (milepost 6.6 to 8.7). |
| | | | | Geologic Hazards: | Proposed routing two branches of Lenwood Fault cross corridor at Milepost 0.6 and 1.1; flood flood and fissility flows are potential hazards in drainages between Milepost 10.0 and 18.7. High potential for soil erosion in drainages between Milepost 5.5 and 7.5, and in young alluvium at Milepost 10.8, 12.0, 14.5, and between 16.0 and 23.0. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Mileposts Begin | Mileposts End | Description | |
|---|---|---|---|---|---|
| 24a cont. | | 18.7 | 22.6 | Sediment/ Rock Types: | Young (active) alluvium of Mojave River channel. |
| | | | | Geologic Hazards: | Flooding, active erosion and deposition in Mojave River channel; liquefaction potential associated with strong ground motion; route crosses Helendale Fault at Milepost 21.5. |
| | | 22.6 | 27.3 | Sediment/ Rock Types: | Alluvium, older alluvium. |
| | | | | Geologic Hazards: | Flooding, debris flows in Buckhorn Wash (Mileposts 27.2 to 27.3). |
| 24b | 6.1 | 0.0 | 6.1 | Sediment/ Rock Types: | Young alluvium, alluvium, older alluvium. |
| | | | | Geologic Hazards: | Flooding, debris flows in drainage channels. |
| 25 | 11.7 | 0.0 | 11.7 | Sediment/ Rock Types: | Alluvium, Tertiary volcanic and sedimentary rocks, granitic bedrock. |
| | | | | Geologic Hazards: | Route crosses two branches of Lenwood Fault (at Mileposts 0.5 and 0.7); potential for flash flooding in Stoddard Valley. |

Table 3-2 (continued)
Inventory of Geologic Resources

| Line No. | Length | Milepost From | Milepost To | | Description |
|---|---|---|---|---|---|
| 24a cont. | | 18.7 | 32.6 | Sedimentary Rock Types | Young (active) alluvium of Jackson River channel. |
| | | | | Geologic Hazards | Flooding, active erosion and deposition in Mojave River channel; liquefaction potential associated with sandy ground; moderate to high stress; Helendale Fault at Milepost 21.5. |
| | | 22.6 | 27.2 | Sedimentary Rock Types | Alluvium, older alluvium. |
| | | | | Geologic Hazards | Flooding, debris flows in Buckhorn Wash (Mileposts 27.2 to 27.3). |
| 24b | 5.1 | 0.0 | 5.1 | Sedimentary Rock Types | Young alluvium, alluvium, older alluvium. |
| | | | | Geologic Hazards | Flooding, debris flows in alluvial channels. |
| 25 | 11.7 | 0.0 | 11.7 | Sedimentary Rock Types | Alluvium, tertiary volcanic and sedimentary rocks, granitic basement. |
| | | | | Geologic Hazards | Faults crossing the Helendale at Lenwood, Hart at Mitchell, 0.3 and 0.77 (approximate) Fault. Flooding in Grapevine Valley. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Mileposts Begin | Mileposts End | Description | |
|---|---|---|---|---|---|
| 26 | 0.6 | 0.0 | 0.6 | Sediment/ Rock Types: | Alluvium, intrusive igneous bedrock. |
| | | | | Geologic Hazards: | None noted. |
| 27 | 13.4 | 0.0 | 13.4 | Sediment/ Rock Types: | Alluvium, paleozoic/mesozoic volcanic and intrusive igneous rocks, older alluvium, younger alluvium. |
| | | | | Geologic Hazards: | Route crosses Helendale Fault at Milepost 5.8; flooding, active erosion and deposition in Mojave River channel (Mileposts 11.8 to 13.2); liquefaction potential near Mojave River. High potential for soil erosion in drainage between Mileposts 6.0 and 10.0. |
| 28 | 3.2 | 0.0 | 3.2 | Sediment/ Rock Types: | Older alluvium, alluvium. |
| | | | | Geologic Hazards: | Flooding, debris flows in drainage channels. |
| 29 | 2.1 | 0.0 | 2.1 | Sediment/ Rock Types: | Young alluvium, alluvium, older alluvium. |
| | | | | Geologic Hazards: | Flooding and debris flows in Fremont Wash and associated branch drainages. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Milepoints Begin | End | Description |
|---|---|---|---|---|
| 26 | 0.6 | 0.0 | 0.6 | Sediment/ Rock Types: Alluvium, intrusive igneous bedrock. |
| | | | | Geologic Hazards: None noted. |
| 27 | 13.4 | 0.0 | 13.4 | Sediment/ Rock Types: Alluvium, pulverized/decomposed volcanic and intrusive igneous rocks, older alluvium, younger alluvium. |
| | | | | Geologic Hazards: Route crosses Helendale Fault at Milepost 3.4; flooding, active erosion and deposition in Mojave River channel (Milepost 11.2 to 13.2); liquefaction potential near Mojave River; little potential for soil erosion in drainage between Milepost 5.0 and 10.0. |
| 28 | 1.2 | 0.0 | 1.2 | Sediment/ Rock Types: Older alluvium, alluvium. |
| | | | | Geologic Hazards: Flooding, debris flows in drainage channels. |
| 29 | 1.1 | 0.0 | 2.1 | Sediment/ Rock Types: Younger alluvium, alluvium, older alluvium. |
| | | | | Geologic Hazards: Flooding and debris flows in Freeman Wash and associated branch drainages. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Mileposts Begin | Mileposts End | Description | |
|---|---|---|---|---|---|
| 30 | 2.1 | 0.0 | 2.1 | Sediment/ Rock Types: | Alluvium, older alluvium. |
| | | | | Geologic Hazards: | Flooding and debris flows in incised drainage. |
| 31 | 5.7 | 0.0 | 5.7 | Sediment/ Rock Types: | Alluvium. |
| | | | | Geologic Hazards: | Flooding, debris flows (Mileposts 0.0 to 2.0). |
| 32 | 16.4 | 0.0 | 16.4 | Sediment/ Rock Types: | Alluvium, pre-Tertiary volcanic and intrusive igneous rocks, older alluvium, and young (active) alluvium of Mojave River channel (Mileposts 14.6 to 15.2). |
| | | | | Geologic Hazards: | Flooding, debris flows in minor drainages and near active channel of Mojave River (Mileposts 14.6 to 15.2); route crosses Helendale Fault at Milepost 4.8. |
| 33 | 15.5 | 0.0 | 15.5 | Sediment/ Rock Types: | Alluvium, pre-Tertiary volcanic rocks, older alluvium. |
| | | | | Geologic Hazards: | Flash flooding, debris flow potential near active channel of Mojave River (Mileposts 14.8 to 14.9); route crosses Helendale Fault at Milepost 5.0. |

Table 3-3 (continued)
Inventory of Geologic Resources

| Link No. | Length | Milepost Begin | Milepost End | Description |
|---|---|---|---|---|
| 30 | 2.1 | 0.0 | 2.1 | Sediment/ Rock Types: Alluvium, older alluvium. |
| | | | | Geologic Hazards: Flooding and debris flows in incised arroyos. |
| 31 | 5.7 | 0.0 | 5.7 | Sediment/ Rock Types: Alluvium. |
| | | | | Geologic Hazards: Flooding, debris flows (Mile post 0.0 to 3.0). |
| 32 | 15.4 | 0.0 | 15.4 | Sediment/ Rock Types: Alluvium and Tertiary volcanic and sedimentary deposits, older alluvium, and energy (oil and) minerals of Mojave Trough (Milepost 7.0 to 15.4). |
| | | | | Geologic Hazards: Flooding, debris flows in incised arroyos and near active channel of Mojave River (Milepost 7.0 to 15.4); earthquake hazards Fault or Milepost 8.0. |
| 33 | 15.5 | 0.0 | 15.5 | Sediment/ Rock Types: Alluvium, pre-Tertiary volcanic rocks, older alluvium. |
| | | | | Geologic Hazards: Flood flooding, debris flow potential near active channel of Mojave River (Milepost 15.5 to 15.9); route crosses Helendale Fault at Milepost 5.0. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Mileposts Begin | Mileposts End | Description | |
|---|---|---|---|---|---|
| 34 | 1.4 | 0.0 | 1.4 | Sediment/ Rock Types: | Older alluvium. |
| | | | | Geologic Hazards: | Flash flooding, debris flows in channel at Milepost 0.8. |
| 35 | 4.7 | 0.0 | 4.7 | Sediment/ Rock Types: | Allvuium, older alluvium. |
| | | | | Geologic Hazards: | Flash flooding, debris flows (between Mileposts 0.0 and 1.0). |
| 36 | 5.8 | 0.0 | 5.8 | Sediment/ Rock Types: | Alluvium. |
| | | | | Geologic Hazards: | Minor flash flooding potential. |
| 37 | 7.3 | 0.0 | 7.3 | Sediment/ Rock Types: | Alluvium, young and old alluvium, intrusive igneous bedrock, Tertiary volcanic and sedimentary rocks. |
| | | | | Geologic Hazards: | Flash flooding potential in gullies/narrow drainages; crosses South Lockhart Fault at Milepost 0.2; debris flows between Mileposts 6.3 and 6.8. |
| 38 | 10.3 | 0.0 | 4.7 | Sediment/ Rock Types: | Alluvium, older alluvium, younger alluvium. |
| | | | | Geologic Hazards: | Route crosses South Lockhart Fault (Milepost 0.3). High potential for soil erosion in young alluvium between Mileposts 0.0 and 2.0. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Milepostsa Begin | Milepostsa End | Description |
|---|---|---|---|---|
| 34 | 1.4 | 0.0 | 1.4 | Sedimentary/ Rock Types: Clifton Alluvium. |
| | | | | Geologic Hazards: Flash flooding, debris flows is channel at Milepost 0.4. |
| 35 | 4.7 | 0.0 | 4.7 | Sedimentary/ Rock Types: Alluvium, other alluvium. |
| | | | | Geologic Hazards: Flash flooding, debris flows between Milepoints 0.0 and 1.0. |
| 36 | 5.0 | 0.0 | 5.0 | Sedimentary/ Rock Types: Alluvium. |
| | | | | Geologic Hazards: Minor flash flooding potential. |
| 37 | 7.3 | 0.0 | 7.3 | Sedimentary/ Rock Types: Alluvium, young and old alluvium, intrusive igneous bedrock, Tertiary volcanic and sedimentary rocks. |
| | | | | Geologic Hazards: Flash flooding potential in multiple narrow drainages crosses South Lassen Fault at Milepost 0.7; debris flows between Milepoints 4.7 and 6.3. |
| 38 | 10.3 | 0.0 | 4.7 | Sedimentary/ Rock Types: Alluvium, other alluvium, younger alluvium. |
| | | | | Geologic Hazards: Route crosses South Lassen Fault (Milepost 6.3). High potential for soil erosion in young alluvium between Milepoints 0.0 and 2.0. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Mileposts Begin | Mileposts End | Description | |
|---|---|---|---|---|---|
| 38 cont. | | 4.7 | 10.8 | Sediment/ Rock Types: | Alluvium and older alluvium. |
| | | | | Geologic Hazards: | Possible flash flooding between Mileposts 8.5 and 10.8. |
| 39 | 6.2 | 0.0 | 6.2 | Sediment/ Rock Types: | Alluvium, older alluvium, Tertiary sedimentary and volcanic rocks. |
| | | | | Geologic Hazards: | Route crosses Spring Fault at Milepost 2.8. |
| 40a | 6.2 | 0.0 | 6.2 | Sediment/ Rock Types: | Alluvium, older alluvium. |
| | | | | Geologic Hazards: | Flash floods and debris flows between Mileposts 0.0 and 3.0. |
| 40b | 4.9 | 0.0 | 4.9 | Sediment/ Rock Types: | Alluvium and older alluvium. |
| | | | | Geologic Hazards: | None noted. |
| 41 | 15.5 | 0.0 | 15.5 | Sediment/ Rock Types: | Alluvium, older alluvium, young alluvium in drainages. |
| | | | | Geologic Hazards: | Flash flooding in drainages/ gullies following infrequent intense storms; route crosses Spring Fault at Milepost 0.2. |

Table 3.5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Milepost Begin | Milepost End | Sites Seen |
|---|---|---|---|---|
| 38 cont. | | 4.7 | 10.5 | Sediment/ Rock Types: Alluvium and older alluvium. Geologic Hazards: Heavily flash flooding between Mileposts 2.5 and 10.8. |
| 39 | 4.2 | 0.0 | 4.2 | Sediment/ Rock Types: Alluvium, older alluvium, Tertiary sedimentary and volcanic rocks. Geologic Hazards: Fluvial erosion; Spring Fault at Milepost 2.8. |
| 40a | 6.1 | 0.0 | 6.2 | Sediment/ Rock Types: Alluvium, older alluvium. Geologic Hazards: Flash floods and debris flows between Mileposts 0.0 and 3.6. |
| 40b | 6.2 | 0.0 | 6.5 | Sediment/ Rock Types: Alluvium and older alluvium. Geologic Hazards: None noted. |
| 41 | 15.5 | 0.0 | 15.5 | Sediment/ Rock Types: Alluvium, older alluvium, minor alluvium in tributaries. Geologic Hazards: Flash flooding in drainages/ gullies following intense/ heavy stormy rain; fluvial erosion; Spring Fault at Milepost 0.2. |

Table 3-5 (continued)
Inventory of Geologic Resources

| Link No. | Length | Mileposts Begin | Mileposts End | Description | |
|---|---|---|---|---|---|
| 42 | 21.9 | 0.0 | 21.9 | Sediment/ Rock Types: | Alluvium, older alluvium, Tertiary sedimentary rocks (Milepost 17.3). |
| | | | | Geologic Hazards: | Flash flooding potential in channelized drainages; route crosses possible unnamed Quaternary faults (at Mileposts 0.2, 16.5 and 16.9), and Spring Fault at Milepost 19.8. |
| 43 | 3.9 | 0.0 | 3.9 | Sediment/ Rock Types: | Alluvium and older alluvium. |
| | | | | Geologic Hazards: | None noted. |
| 44 | 16.2 | 0.0 | 7.0 | Sediment/ Rock Types: | Alluvium. |
| | | | | Geologic Hazards: | None noted. |
| | | 7.0 | 16.2 | Sediment/ Rock Types: | Alluvium, pre-Tertiary igneous and metamorphic rocks. |
| 45 | 5.7 | 0.0 | 5.7 | Sediment/ Rock Types: | Alluvium, playa deposits of Ivanpah Lake. |
| | | | | Geologic Hazards: | Inundation of playa surface following intense storms. |

Table 3-3 (continued)
Inventory of Geologic Resources

| Link No. | Length | Milepoints Begin | Milepoints End | Description |
|---|---|---|---|---|
| 62 | 21.2 | 0.0 | 21.2 | Sedimentary/ Rock Types: Alluvium, older alluvium, Tertiary sedimentary rocks (Wilcox) [17-3]. |
| | | | | Geologic Hazards: Flash flooding potential in channelized drainage route crosses possible unmapped depositionary facilis (or Milepoints 0.5, 1.5 and 15.5), and Spring Fork at Milepost 17.8. |
| 63 | 1.9 | 0.0 | 1.9 | Sedimentary/ Rock Types: Alluvium and older alluvium. |
| | | | | Geologic Hazards: None noted. |
| 64 | 16.1 | 0.0 | 1.0 | Sedimentary/ Rock Types: Alluvium. |
| | | | | Geologic Hazards: None noted. |
| | | 1.0 | 16.1 | Sedimentary/ Rock Types: Alluvium, pre-Tertiary igneous and metamorphic rocks. |
| 65 | 3.1 | 0.0 | 3.1 | Sedimentary/ Rock Types: Alluvium, place deposits of Wapsipinicon. |
| | | | | Geologic Hazards: Inundation of alluvial surface indicating intense storms. |

## TABLE 3-6
## INVENTORY OF PALEONTOLOGICAL RESOURCES

| Link | Paleontologic Resources Description |
|---|---|
| 6 | Miocene-age mammalian fossils |
| 9 | Permian-age invertebrate fossils including corals, fusilinids, brachiopods |
| 18 | Pleistocene-age mammalian fossils |
| 19 | Pleistocene-age mammalian fossils |
| 20b | Miocene-age mammalian fossils; also fossil palm fragments |
| 22 | Pleistocene-age mammalian fossils |
| 23 | Miocene-age mammalian fossils |
| 25 | Miocene-age mammalian fossils |

TABLE 3-7
SOILS INVENTORY TABLE

| Link No. | Length (Miles) | Mileposts Begin | Mileposts End | Soil Units | Soil Erosion Potential* |
|---|---|---|---|---|---|
| 0 | 13.5 | 0.0 | 13.5 | 2, 4 | Moderate-Low |
| 1 | 16.6 | 0.0 | 7.0 | 4 | Moderate-Low |
| | | 7.0 | 10.6 | 5 | Low-Nonexistent |
| | | 10.6 | 16.6 | 4 | Moderate-Low |
| 2 | 6.5 | 0.0 | 1.8 | 4 | Moderate-Low |
| | | 1.8 | 2.3 | 5 | Low-nonexistent |
| | | 2.3 | 2.6 | 4 | Moderate-Low |
| | | 2.6 | 2.7 | 5 | Low-Nonexistent |
| | | 2.7 | 6.5 | 4, 2 | Moderate-Low |
| 3 | 8.4 | 0.0 | 0.2 | 5 | Low-nonexistent |
| | | 0.2 | 4.5 | 4, 2 | Moderate-Low |
| | | 4.5 | 8.4 | 7 | Low-Nonexistent |
| 4 | 1.9 | 0.0 | 1.7 | 2 | Moderate-Low |
| | | 1.7 | 1.9 | 7 | Low-Nonexistent |
| 5a | 0.2 | 0.0 | 0.2 | 4 | Moderate-Low |
| 5b | 4.8 | 0.0 | 4.0 | 4 | Moderate-Low |
| | | 4.0 | 4.8 | 7 | Low-Nonexistent |
| 5c | 12.3 | 0.0 | 1.2 | 7 | Low-Nonexistent |
| | | 1.2 | 6.9 | 4 | Low-Moderate |
| | | 6.9 | 10.1 | 5 | Low-Nonexistent |
| | | 10.1 | 12.3 | 6 | Low-Moderate |
| 6 | 83.3 | 0.0 | 0.3 | 7 | |
| | | 0.3 | 1.4 | 2, 4 | |
| | | 1.4 | 2.0 | 5 | |
| | | 2.0 | 10.2 | 2, 4 | |
| | | 10.2 | 12.0 | 5 | |
| | | 12.0 | 29.4 | 6, 4, 2 | |
| | | 29.4 | 31.5 | 5 | |
| | | 31.5 | 33.6 | 4 | |
| | | 33.6 | 34.2 | 5 | |
| | | 34.2 | 38.8 | 4 | |
| | | 38.8 | 40.3 | 5 | |
| | | 40.3 | 41.8 | 4 | |

*Soil erosion potential is based on short-term, unmitigated impact.

TABLE 3-7
SOIL INVENTORY TABLE

| Link No. | Length (Miles) | Inclusions (Miles) | | Soil Units | Soil Erosion Potential* |
|---|---|---|---|---|---|
| 0 | 13.5 | 0.0 | 13.5 | 2, 6 | Moderate-Low |
| 1 | 16.4 | 0.0 | 2.0 | 4 | Moderate-Low |
| | | 2.0 | 10.5 | 5 | Low-Tolerant |
| | | 10.5 | 16.4 | 4 | Moderate-Low |
| 2 | 6.5 | 0.0 | 1.0 | 4 | Moderate-Low |
| | | 1.0 | 2.3 | 5 | Low-Nonexistent |
| | | 2.3 | 2.6 | 4 | Moderate-Low |
| | | 2.6 | 2.7 | 5 | Low-Nonexistent |
| | | 2.7 | 6.5 | 4, 2 | Moderate-Low |
| 3 | 8.4 | 0.0 | 0.2 | 5 | Low-Nonexistent |
| | | 0.2 | 5.5 | 4, 2 | Moderate-Low |
| | | 5.5 | 8.4 | 5 | Low-Nonexistent |
| 4 | 1.3 | 0.0 | 1.3 | 2 | Moderate-Low |
| | | 1.3 | 1.3 | 5 | Low-Nonexistent |
| 5a | 0.2 | 0.0 | 0.2 | 4 | Moderate-Low |
| 5b | 9.9 | 0.0 | 4.0 | 4 | Moderate-Low |
| | | 4.0 | 4.8 | 5 | Low-Nonexistent |
| 5c | 12.2 | 0.0 | 1.1 | 5 | Low-Nonexistent |
| | | 1.1 | 6.3 | 4 | Low-Moderate |
| | | 6.3 | 10.1 | 5 | Low-Nonexistent |
| | | 10.1 | 12.2 | 6 | Low-Moderate |
| 6 | 34.3 | 0.0 | 0.3 | 5 | |
| | | 0.3 | 1.4 | 3, 2 | |
| | | 1.4 | 2.0 | 5 | |
| | | 2.0 | 10.3 | 3, 4 | |
| | | 10.3 | 12.0 | 5 | |
| | | 12.0 | 23.4 | 3, 4, 2 | |
| | | 23.4 | 31.5 | 5 | |
| | | 31.5 | 34.3 | 3 | |
| | | 34.3 | 34.5 | 5 | |
| | | 34.5 | 35.3 | 4 | |
| | | 35.3 | 40.3 | 5 | |
| | | 40.3 | 41.8 | 4 | |

*Soil erosion potential is based on short-term, unmitigated impact.

Table 3-7 (continued)
Soils Inventory Table

| Link No. | Length (Miles) | Mileposts Begin | Mileposts End | Soil Units | Soil Erosion Potential |
|---|---|---|---|---|---|
| 6 (cont.) | | 41.8 | 42.5 | 5 | |
| | | 42.5 | 46.6 | 4 | |
| | | 46.6 | 46.9 | 5 | |
| | | 46.9 | 47.5 | 4 | |
| | | 47.5 | 47.7 | 7 | Low-Nonexistent |
| | | 47.7 | 48.6 | 4 | |
| | | 48.6 | 48.9 | 5 | |
| | | 48.9 | 49.5 | 4 | |
| | | 49.5 | 50.1 | 5 | |
| | | 50.1 | 54.0 | 4 | |
| | | 54.0 | 54.5 | 5 | |
| | | 54.5 | 64.0 | 4 | |
| | | 64.0 | 64.8 | 5 | |
| | | 64.8 | 70.6 | 4 | |
| | | 70.6 | 71.4 | 5 | |
| | | 71.4 | 80.1 | 4, 6 | |
| | | 80.1 | 80.3 | 5 | |
| | | 80.3 | 80.6 | 3 | |
| | | 80.6 | 80.8 | 4 | |
| | | 80.8 | 82.0 | 5 | |
| | | 82.0 | 82.7 | 3 | |
| | | 82.7 | 83.3 | 4, 6 | |
| 7 | 13.6 | 0.0 | 7.5 | 6, 4 | |
| | | 7.5 | 9.6 | 5 | |
| | | 9.6 | 12.1 | 4 | |
| | | 12.1 | 13.3 | 5 | |
| | | 13.3 | 13.6 | 4 | |
| 8 | 12.9 | 0.0 | 6.0 | 6, 4 | |
| | | 6.0 | 7.4 | 7 | |
| | | 7.0 | 12.9 | 4 | |
| 9 | 25.0 | 0.0 | 0.5 | 4 | |
| | | 0.5 | 1.8 | 5 | |
| | | 1.8 | 24.3 | 4 | |
| | | 24.3 | 25.0 | 5 | |
| 10 | 19.7 | 0.0 | 0.3 | 4 | |
| | | 0.3 | 7.7 | 5 | |
| | | 7.7 | 19.7 | 4 | |

Table 3-7 (continued)
Soils Inventory Table

| Link No. | Length (Miles) | Mileposts Begin | Mileposts End | Soil Units | Soil Erosion Potential |
|---|---|---|---|---|---|
| 11 | 20.5 | 0.0 | 1.8 | 4 | |
| | | 1.8 | 3.6 | 7 | |
| | | 3.6 | 6.8 | 4 | |
| | | 6.8 | 9.1 | 5 | |
| | | 9.1 | 12.4 | 4 | |
| | | 12.4 | 13.2 | 5 | |
| | | 13.2 | 16.4 | 6 | |
| | | 16.4 | 20.5 | 1 | |
| 12 | 5.0 | 0.0 | 1.3 | 4 | |
| | | 1.3 | 2.3 | 7 | |
| | | 2.3 | 4.3 | 4 | |
| | | 4.3 | 5.0 | 5 | |
| 13 | 10.6 | 0.0 | 1.2 | 5 | |
| | | 1.2 | 7.5 | 4 | |
| | | 7.5 | 8.3 | 5 | |
| | | 8.3 | 10.6 | 6, 4, 2 | |
| 14 | 4.9 | 0.0 | 1.7 | 2 | |
| | | 1.7 | 4.9 | 1 | |
| 15 | 5.0 | 0.0 | 0.8 | 1 | |
| | | 0.8 | 1.7 | 5 | |
| | | 1.7 | 2.1 | 3 | |
| | | 2.1 | 2.5 | 5 | |
| | | 2.5 | 2.8 | 3 | |
| | | 2.8 | 3.5 | 5 | |
| | | 3.5 | 4.3 | 6 | |
| | | 4.3 | 4.6 | 5 | |
| | | 4.6 | 5.0 | 6 | |
| 16 | 8.6 | 0.0 | 7.5 | 2, 4 | |
| | | 7.5 | 7.7 | 5 | |
| | | 7.7 | 8.1 | 4 | |
| | | 8.1 | 8.6 | 5 | |

Table 3-7 (continued)
Soils Inventory Table

| Link No. | Length (miles) | Milepoints Length | Milepoints Total | Soil Units | Soil Engineering Properties |
|---|---|---|---|---|---|
| 11 | 20.5 | 0.0 | 1.5 | 4 | |
| | | 1.5 | 3.4 | 7 | |
| | | 3.4 | 5.0 | 6 | |
| | | 5.0 | 7.1 | 5 | |
| | | 7.1 | 12.5 | 4 | |
| | | 12.5 | 15.7 | 5 | |
| | | 15.7 | 18.2 | 6 | |
| | | 18.2 | 20.5 | 1 | |
| 12 | 5.0 | 0.0 | 1.3 | 4 | |
| | | 1.3 | 4.3 | 7 | |
| | | 4.3 | 6.3 | 4 | |
| | | 6.3 | 5.0 | 5 | |
| 13 | 10.4 | 0.0 | 1.2 | 5 | |
| | | 1.2 | 7.5 | 4 | |
| | | 7.5 | 8.7 | 5 | |
| | | 8.7 | 10.4 | 4,7 | |
| 14 | 1.0 | 0.0 | 1.7 | 2 | |
| | | 1.7 | 4.0 | 1 | |
| 15 | 3.0 | 0.0 | 0.8 | 1 | |
| | | 0.8 | 1.7 | 2 | |
| | | 1.7 | 2.1 | 3 | |
| | | 2.1 | 2.3 | 2 | |
| | | 2.3 | 2.8 | 3 | |
| | | 2.8 | 3.2 | 2 | |
| | | 3.2 | 3.5 | 6 | |
| | | 3.5 | 4.4 | 5 | |
| | | 4.4 | 5.0 | 8 | |
| 16 | 8.4 | 0.0 | 2.3 | 4,4 | |
| | | 2.3 | 3.7 | 2 | |
| | | 3.7 | 6.1 | 6 | |
| | | 6.1 | 8.4 | 5 | |

Table 3-7 (continued)
Soils Inventory Table

| Link No. | Length (Miles) | Mileposts Begin | Mileposts End | Soil Units | Soil Erosion Potential |
|---|---|---|---|---|---|
| 17 | 5.3 | 0.0 | 0.9 | 1 | |
| | | 0.9 | 2.7 | 4 | |
| | | 2.7 | 3.4 | 5 | |
| | | 3.4 | 4.8 | 6 | |
| | | 4.8 | 4.9 | 5 | |
| | | 4.9 | 5.3 | 6 | |
| 18 | 3.7 | 0.0 | 3.7 | 6 | |
| 19 | 7.9 | 3.7 | 4.8 | 6, 4 | |
| | | 4.8 | 5.0 | 3 | |
| | | 5.0 | 5.3 | 4 | |
| | | 5.3 | 5.5 | 3 | |
| | | 5.5 | 7.9 | 4, 6 | |
| 20a | 21.0 | 0.0 | 4.5 | 4 | |
| | | 4.5 | 5.6 | 3 | |
| | | 5.6 | 5.9 | 4 | |
| | | 5.9 | 7.6 | 3 | |
| | | 7.6 | 9.0 | 2 | |
| | | 9.0 | 10.9 | 7 | |
| | | 10.9 | 21.0 | 2, 6, 4 | |
| 20b | 17.9 | 0.0 | 3.8 | 4 | |
| | | 3.8 | 4.1 | 5 | |
| | | 4.1 | 8.4 | 4, 6 | |
| | | 8.4 | 10.3 | 5 | |
| | | 10.3 | 10.8 | 3 | |
| | | 10.8 | 17.9 | 4 | |
| 21a | 6.0 | 0.0 | 6.0 | 6, 4, 2 | |
| 21b | 8.0 | 0.0 | 8.0 | 6, 4, 2 | |
| 22 | 21.1 | 0.0 | 18.1 | 6, 4 | |
| | | 18.1 | 21.1 | 1 | |
| 23 | 13.8 | 0.0 | 2.7 | 1 | |
| | | 2.7 | 10.6 | 2, 6 | |
| | | 10.6 | 11.1 | 5 | |
| | | 11.1 | 12.4 | 4, 6 | |
| | | 12.4 | 13.8 | 5 | |

Table 3-7 (continued)
Soils Inventory Table

| Link No. | Length (Miles) | Milepoints Start | Milepoints End | Soil Units | Soil Erosion Potential |
|---|---|---|---|---|---|
| 17 | 5.3 | 0.0 | 0.3 | 1 | |
| | | 0.4 | 2.7 | 4 | |
| | | 2.7 | 3.4 | 5 | |
| | | 3.4 | 4.8 | 6 | |
| | | 4.8 | 4.9 | 5 | |
| | | 4.9 | 5.3 | 5 | |
| 18 | 3.7 | 0.0 | 3.7 | 6 | |
| 19 | 7.3 | 3.7 | 4.8 | 6,4 | |
| | | 4.8 | 5.0 | 5 | |
| | | 5.0 | 5.1 | 4 | |
| | | 5.1 | 5.5 | 5 | |
| | | 5.5 | 7.3 | 6,4 | |
| 20a | 21.0 | 0.0 | 4.5 | 4 | |
| | | 4.5 | 5.6 | 5 | |
| | | 5.6 | 5.8 | 4 | |
| | | 5.9 | 7.6 | 3 | |
| | | 7.6 | 8.0 | 5 | |
| | | 8.0 | 10.2 | 7 | |
| | | 10.2 | 21.0 | 6,5,4 | |
| 20b | 17.9 | 0.0 | 1.6 | 4 | |
| | | 3.8 | 4.1 | 5 | |
| | | 4.1 | 8.4 | 6,4 | |
| | | 8.4 | 10.3 | 5 | |
| | | 10.3 | 10.8 | 3 | |
| | | 10.8 | 17.7 | 4 | |
| 21a | 4.0 | 0.0 | 4.0 | 6,4,2 | |
| 21b | 8.0 | 0.0 | 8.0 | 6,4,2 | |
| 22 | 21.1 | 0.0 | 10.1 | 6,4 | |
| | | 18.1 | 21.1 | 1 | |
| 23 | 15.8 | 0.0 | 2.7 | 1 | |
| | | 2.7 | 10.6 | 2,4 | |
| | | 10.6 | 11.1 | 5 | |
| | | 11.1 | 12.4 | 6,4 | |
| | | 12.4 | 13.8 | 5 | |

Table 3-7 (continued)
Soils Inventory Table

| Link No. | Length (Miles) | Mileposts Begin | Mileposts End | Soil Units | Soil Erosion Potential |
|---|---|---|---|---|---|
| 24a | 27.3 | 0.0 | 0.5 | 5 | |
| | | 0.5 | 0.9 | 4 | |
| | | 0.9 | 1.1 | 5 | |
| | | 1.1 | 6.6 | 4 | |
| | | 6.6 | 6.9 | 5 | |
| | | 6.9 | 11.8 | 4, 6 | |
| | | 11.8 | 12.1 | 1 | |
| | | 12.1 | 12.4 | 6 | |
| | | 12.4 | 14.2 | 5 | |
| | | 14.2 | 14.7 | 1 | |
| | | 14.7 | 16.2 | 6 | |
| | | 16.2 | 17.0 | 1 | |
| | | 17.0 | ? | 4 | |
| | | ? | 27.1 | 6 | |
| | | 27.1 | 27.3 | 1 | |
| 24b | 6.1 | 0.0 | 0.1 | 1 | |
| | | 0.1 | 5.8 | 6, 2 | |
| | | 5.8 | 6.1 | 1 | |
| 25 | 11.7 | 0.0 | 0.5 | 5 | |
| | | 0.5 | 0.7 | 4 | |
| | | 0.7 | 1.8 | 5 | |
| | | 1.8 | 11.4 | 4, 2 | |
| | | 11.4 | 11.7 | 5 | |
| 26 | 0.6 | 0.0 | 0.4 | 5 | |
| | | 0.4 | 0.6 | 4 | |
| 27 | 13.4 | 0.0 | 0.8 | 4 | |
| | | 0.8 | 1.8 | 5 | |
| | | 1.8 | 5.7 | 4 | |
| | | 5.7 | 7.2 | 5 | |
| | | 7.2 | 11.6 | 6, 4 | |
| | | 11.6 | 13.1 | 1 | |
| | | 13.1 | 13.4 | 6 | |
| 28 | 3.2 | 0.0 | 3.2 | 6, 4 | |
| 29 | 2.1 | 0.0 | 0.8 | 1 | |
| | | 0.8 | 2.1 | 4, 6 | |

Table 3-7 (continued)
Soils Inventory Table

| Link No. | Length (Miles) | Milepost From | Milepost To | Soil Class | Soil Erosion Potential |
|---|---|---|---|---|---|
| 24a | 27.3 | 0.0 | 0.2 | 5 | |
| | | 0.2 | 0.3 | 4 | |
| | | 0.3 | 1.1 | 5 | |
| | | 1.1 | 6.5 | 4 | |
| | | 6.5 | 8.8 | 5 | |
| | | 8.8 | 11.0 | 6, 5 | |
| | | 11.0 | 12.1 | 1 | |
| | | 12.1 | 12.4 | 6 | |
| | | 12.4 | 14.2 | 5 | |
| | | 14.2 | 14.7 | 1 | |
| | | 14.7 | 16.2 | 6 | |
| | | 16.2 | 17.0 | 1 | |
| | | 17.0 | 2 | 4 | |
| | | 2 | 22.1 | 5 | |
| | | 22.1 | 27.3 | 1 | |
| 24b | 6.1 | 0.0 | 0.1 | 1 | |
| | | 0.1 | 5.5 | 6, 2 | |
| | | 5.5 | 6.1 | 1 | |
| 25 | 14.7 | 0.0 | 0.5 | 5 | |
| | | 0.5 | 0.7 | 4 | |
| | | 0.7 | 1.3 | 5 | |
| | | 1.3 | 11.4 | 6, 2 | |
| | | 11.4 | 13.7 | 5 | |
| 26 | 0.4 | 0.0 | 0.4 | 5 | |
| | | 0.4 | 0.4 | 4 | |
| 27 | 14.4 | 0.0 | 0.8 | 4 | |
| | | 0.8 | 1.8 | 5 | |
| | | 1.8 | 5.7 | 4 | |
| | | 5.7 | 7.2 | 5 | |
| | | 7.2 | 11.6 | 6, 4 | |
| | | 11.6 | 12.1 | 1 | |
| | | 12.1 | 12.4 | 6 | |
| 28 | 3.2 | 0.0 | 3.2 | 6, 4 | |
| 29 | 2.1 | 0.0 | 0.8 | 1 | |
| | | 0.8 | 2.1 | 4, 6 | |

Table 3-7 (continued)
Soils Inventory Table

| Link No. | Length (Miles) | Mileposts Begin | Mileposts End | Soil Units | Soil Erosion Potential |
|---|---|---|---|---|---|
| 30 | 2.1 | 0.0 | 2.1 | 6, 4 | |
| 31 | 5.7 | 0.0 | 5.7 | 4 | |
| 32 | 16.0 | 0.0 | 4.7 | 4 | |
| | | 4.7 | 5.1 | 5 | |
| | | 5.1 | 6.4 | 4 | |
| | | 6.4 | 6.6 | 5 | |
| | | 6.6 | 11.3 | 4, 6 | |
| | | 11.3 | 11.6 | 5 | |
| | | 11.6 | 12.2 | 4 | |
| | | 12.2 | 14.6 | 5 | |
| | | 14.6 | 15.1 | 1 | |
| | | 15.1 | 16.0 | 6 | |
| 33 | 15.3 | 0.0 | 0.4 | 5 | |
| | | 0.4 | 5.0 | 4 | |
| | | 5.0 | 5.3 | 5 | |
| | | 5.3 | 14.0 | 4, 6 | |
| | | 14.0 | 14.7 | 5 | |
| | | 14.7 | 14.9 | 1 | |
| | | 14.9 | 15.3 | 6 | |
| 34 | 1.4 | 0.0 | 1.4 | 6 | |
| 35 | 5.1 | 0.0 | 5.1 | 6, 4 | |
| 36 | 5.9 | 0.0 | 0.1 | 1 | |
| | | 0.1 | 5.9 | 4 | |
| 37 | 7.3 | 0.0 | 0.5 | 1 | |
| | | 0.5 | 1.3 | 4, 6 | |
| | | 1.3 | 3.2 | 5 | |
| | | 3.2 | 4.6 | 4, 6 | |
| | | 4.6 | 4.8 | 5 | |
| | | 4.8 | 6.3 | 4 | |
| | | 6.3 | 6.8 | 5 | |
| | | 6.8 | 7.3 | 4, 6 | |
| 38 | 10.3 | 0.0 | 0.7 | 1 | |
| | | 0.7 | 10.3 | 6, 2, 4 | |

Table 3-7 (continued)
Soils Inventory Items

| Line No. | Length (Miles) | Milepostats Begin | Milepostats End | Soil Units | Soil Erosion Potential |
|---|---|---|---|---|---|
| 30 | 2.4 | 0.0 | 2.1 | 6,4 | |
| 31 | 5.7 | 0.0 | 5.7 | 6 | |
| 32 | 14.0 | 0.0 | 4.7 | 6 | |
| | | 4.7 | 5.1 | 5 | |
| | | 5.1 | 6.4 | 6 | |
| | | 6.4 | 6.6 | 5 | |
| | | 6.6 | 11.3 | 4,6 | |
| | | 11.3 | 11.6 | 5 | |
| | | 11.6 | 12.2 | 4 | |
| | | 12.2 | 14.6 | 5 | |
| | | 14.6 | 15.1 | 1 | |
| | | 15.1 | 16.0 | 6 | |
| 33 | 16.4 | 0.0 | 0.4 | 5, | |
| | | 0.4 | 2.7 | 4, | |
| | | 2.7 | 5.0 | 5 | |
| | | 5.0 | 5.3 | 4,6 | |
| | | 5.3 | 10.0 | 5 | |
| | | 10.0 | 10.7 | 1 | |
| | | 10.7 | 14.8 | 5 | |
| | | 14.8 | 15.3 | | |
| 34 | 1.9 | 0.0 | 1.9 | 6 | |
| 35 | 6.1 | 0.0 | 5.1 | 6,4 | |
| 36 | 5.4 | 0.0 | 5.1 | 1 | |
| | | 5.1 | 5.9 | 4 | |
| 37 | 7.2 | 0.0 | 0.3 | 1 | |
| | | 0.3 | 1.3 | 6,4 | |
| | | 1.3 | 1.7 | 5 | |
| | | 1.7 | 2.2 | 4,6 | |
| | | 2.2 | 2.4 | 1 | |
| | | 2.4 | 2.7 | 4 | |
| | | 2.7 | 3.3 | 5 | |
| | | 3.3 | 5.8 | 5 | |
| | | 5.8 | 7.2 | 4,6 | |
| 38 | 10.1 | 0.0 | 0.7 | 1 | |
| | | 0.7 | 10.1 | 6,2,4 | |

Table 3-7 (continued)
Soils Inventory Table

| Link No. | Length (Miles) | Mileposts Begin | Mileposts End | Soil Units | Soil Erosion Potential |
|---|---|---|---|---|---|
| 39 | 6.2 | 0.0 | 0.3 | 6 | |
| | | 0.3 | 0.7 | 5 | |
| | | 0.7 | 3.0 | 4, 6 | |
| | | 3.0 | 3.2 | 5 | |
| | | 3.2 | 6.2 | 4, 2 | |
| 40 | 11.1 | 0.0 | 11.1 | 2, 4, 6 | |
| 41 | 15.5 | 0.0 | 10.9 | 4, 6 | |
| | | 10.9 | 11.5 | 1 | |
| | | 11.5 | 13.8 | 6 | |
| | | 13.8 | 14.1 | 1 | |
| | | 14.1 | 15.5 | 6 | |
| 42 | 21.9 | 0.0 | 17.1 | 4, 6 | |
| | | 17.1 | 17.3 | 5 | |
| | | 17.3 | 21.9 | 6, 2 | |
| 43 | 3.9 | 0.0 | 0.2 | 1 | |
| | | 0.2 | 3.9 | 2, 4 | |
| 44 | 16.2 | 0.0 | 7.0 | 2, 4 | Low-Moderate |
| | | 7.0 | 16.2 | 4, 5 | Low-Moderate, Low-Nonexistent |
| 45 | 5.7 | 0.0 | 5.7 | 2, 4 | Low-Moderate |

TABLE 3-8
SOIL EROSION IMPACT ASSESSMENT MODEL

| Sensitivity (Soil Erosion Potential | Quality and Quantity (Access Level) | Impact Potential Long-Term | Impact Potential Short-Term |
|---|---|---|---|
| High | (1) Sufficient | Low | Low |
| | (2) Upgrade | Low | Moderate |
| | (3) New | Low | High |
| Moderate to Low | (1) Sufficient | Low | Low |
| | (2) Upgrade | Low | Low |
| | (3) New | Moderate to Low | Moderate to Low |
| Low | (1) Sufficient | Negligible | Negligible |
| | (2) Upgrade | Low to Negligible | Low to Negligible |
| | (3) New | Low | Low |

TABLE 3-9
PALEONTOLOGICAL RESOURCES IMPACT ASSESSMENT MODEL

| Sensitivity | Quality and Quantity (Access Level) | Impact Potential (Long-Term) |
|---|---|---|
| High to Moderate | (1) Sufficient | Low to Negligible |
| | (2) Upgrade | Moderate to Low |
| | (3) New | High to Moderate |
| Moderate to Low | (1) Sufficient | Negligible |
| | (2) Upgrade | Low |
| | (3) New | Moderate to Low |

TABLE 3-10
IMPACT ASSESSMENT/MITIGATION PLANNING CHART
SOIL EROSION

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 13.5 | 0.0-13.5 | I | L (.5) | - | Sufficient Access/ Soil Types 2 and 4 | - | - | - | - |
| 1 | 16.6 | 0.0- 7.3 | I | L (.5) | - | Sufficient Access/ Soil Types 2 and 4 | - | - | - | - |
| | | 7.3-10.5 | I | L/N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 10.5-16.6 | I | L (.5) | - | Sufficient Access/ Soil Type 4 | - | - | - | - |
| 2 | 6.5 | 0.0- 6.5 | I | L (.5) | - | Sufficient Access/ Soil Types 2 and 4 (Type 5 from Mileposts 1.8-2.3 and 2.5-2.7) | - | - | - | - |
| 3 | 8.4 | 0.0- 4.5 | I | L (.5) | - | Sufficient Access/ Soil Types 2 and 4 | - | - | - | - |
| | | 4.5- 6.4 | I | N (0) | - | Sufficient Access/ Soil Type 7 | - | - | - | - |
| | | 6.4- 8.4 | I | L (.5) | - | New Access/ Soil Type 7 | - | - | - | - |

TABLE 3-10
IMPACT ASSESSMENT/MITIGATION PLANNING CHART
SOIL EROSION

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Feasible Mitigation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 13.5 | 0.0-13.5 | I | L (.5) | - | Sufficient Access/ Soil Types 2 and 4 | - | - | | - |
| 1 | 16.6 | 0.0- 7.3 | I | L (.5) | - | Sufficient Access/ Soil Types 2 and 4 | - | - | | - |
| | | 7.3-10.5 | I | L/M (0) | - | Sufficient Access/ Soil Type 5 | - | - | | - |
| | | 10.5-16.6 | I | L (.5) | - | Sufficient Access/ Soil Type 4 | - | - | | - |
| 2 | 6.5 | 0.0- 6.5 | I | L (.5) | - | Sufficient Access/ Soil Types 2 and 4 (Type 5 from Mileposts 1.3-2.1 and 2.6-2.7) | - | - | | - |
| 3 | 3.4 | 0.0- 3.7 | I | L (.5) | - | Sufficient Access/ Soil Types 2 and 4 | - | - | | - |
| | | 3.5- 6.4 | I | M (0) | - | Sufficient Access/ Soil Type 7 | - | - | | - |
| | | 6.4- 8.4 | I | L (.5) | - | New Access/ Soil Type 7 | - | - | | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 1.9 | 0.0- 1.9 | I | L (.5) | - | Sufficient Access/ Soil Type 2 | - | - | - | - |
| 5a | 0.2 | 0.0- 0.2 | I | L (.5) | - | Sufficient Access/ Soil Type 2 | - | - | - | - |
| 5b | 4.8 | 0.0- 4.0 | I | L (.5) | - | Sufficient Access/ Soil Type 2 | - | - | - | - |
| | | 4.0- 4.8 | I | N (0) | - | Sufficient Access/ Soil Type 7 | - | - | - | - |
| 5c | 12.3 | 0.0- 1.2 | I | N (0) | - | Sufficient Access/ Soil Type 7 | - | - | - | - |
| | | 1.2- 6.9 | I | L (.5) | - | Sufficient Access/ Soil Types 2 and 4 | - | - | - | - |
| | | 6.9- 7.3 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 7.3- 9.0 | I | N (0) | - | New Access/Soil Type 5 | - | - | - | - |
| | | 9.0-10.1 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 5c (cont.) | | 10.1-12.3 | I | L (.5) | - | Sufficient Access/ Soil Type 6 | - | - | - | - |
| 6 | 83.3 | 0.0- 1.4 | I | L (.5) | - | Sufficient Access/ Soil Types 2 and 4 | - | - | - | - |
| | | 1.4- 2.0 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 2.0-10.1 | I | L (.5) | - | Sufficient Access/ Soil Types 2 and 4 | - | - | - | - |
| | | 10.1-12.0 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 12.0-29.4 | I | L (.5) | - | Sufficient Access/ Soil Types 2, 4 and 6 | - | - | - | - |
| | | 29.4-31.2 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 31.2-42.0 | I | L (.5) | - | Sufficient Access/ Soil Type 4 (Type 5 from Milepost 33.6-34.2) | - | - | - | - |

Table 2-10 (continued)
Impact Assessment/Mitigation Planning Sheet
Soil Erosion

| Link Number | Length | Milepost | Impact Type | Initial Long-Term Impact Level | Stip-ulation Cost? | Impact Description | Residual Long-term Impact Level | Residual Mitigation Impact Level | Stip-ulation Cost? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 5c (cont.) | | 10.1-12.3 | I | L (.5) | - | Sufficient Access/ Soil Type 4 | - | - | - | - |
| 6 | 23.3 | 0.0-1.6 | I | L (.5) | - | Sufficient Access/ Soil Types 2 and 4 | - | - | - | - |
| | | 1.6-2.0 | I | M (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 2.0-10.1 | I | L (.5) | - | Sufficient Access/ Soil Types 2 and 4 | - | - | - | - |
| | | 10.1-12.0 | I | M (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 12.0-20.4 | I | L (.5) | - | Sufficient Access/ Soil Types 2, 4 and 6 | - | - | - | - |
| | | 20.4-21.2 | I | M (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 21.2-23.0 | I | L (.5) | - | Sufficient Access/ Soil Type 4 (Type 3 from Milepost 22.6-23.0) | - | - | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 (cont.) | | 42.0-42.4 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 42.4-48.5 | I | L (.5) | - | Sufficient Access/ Soil Type 4 (Type 5 from Milepost 47.1-47.3) | - | - | - | - |
| | | 48.5-49.0 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 49.0-49.5 | I | L (.5) | - | Sufficient Access/ Soil Type 4 | - | - | - | - |
| | | 49.5-50.0 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 50.0-63.8 | I | L (.5) | - | Sufficient Access/ Soil Type 4 (Type 5 at Mileposts 59.5 and 60.0) | - | - | - | - |
| | | 63.8-64.5 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Milepoints | Impact Type | Initial Impact Level | Mitigation Cost? | Impact Description | Reasonable Mitigation | Residual Long-Term Impact Level | Significant Mitigation Impact? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 (cont.) | | 42.0-42.4 | I | H(0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 42.4-42.5 | I | L(.5) | - | Sufficient Access/ Soil Type 4 (Type 1 Peat Mineral Mix- ture) | - | - | - | - |
| | | 42.5-43.0 | I | M(0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 43.0-43.5 | I | L(.5) | - | Sufficient Access/ Soil Type 4 | - | - | - | - |
| | | 43.5-50.0 | I | H(0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 50.0-51.4 | I | L(.5) | - | Sufficient Access/ Soil Type 4 (Type 5 or Mix- ture 5&5 and 50.0) | - | - | - | - |
| | | 51.8-54.5 | I | H(0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 (cont.) | | 64.5-79.8 | I | L (.5) | - | Sufficient Access/ Soil Types 4 and 6 | - | - | - | - |
| | | 79.8-81.8 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 81.8-83.5 | I | L (.5) | - | Sufficient Access/ Soil Type 4 | - | - | - | - |
| 7 | 13.5 | 0.0- 7.4 | I | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (1) | - | - |
| | | 7.4- 9.6 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 9.6-12.1 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |
| | | 12.1-13.3 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 13.3-13.5 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |

Table 4-18 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Lake Segment | Length | Milepoints | Impact Type | Initial Impact Level | Significant Impact? | Impact Description | Mitigation Level | Residual Impact Level | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|
| 6 (cont'd) | | 65.3-75.8 | I | L (3) | - | Sufficient Access/ Soil Types 4 and 6 | - | - | - |
| | | 75.8-81.8 | I | M (6) | - | Sufficient Access/ Soil Type 5 | - | - | - |
| | | 81.8-83.5 | I | L (3) | - | Sufficient Access/ Soil Type 4 | - | - | - |
| 7 | 18.3 | 0.0- 7.9 | I | M/L (5) | Yes | Have Access/ Soil Types 1 and 5 | 12 | L (1) | - |
| | | 7.9- 9.6 | I | L (3) | - | Have Access/ Soil Type 5 | - | - | - |
| | | 9.6-12.1 | I | M/L (5) | Yes | Have Access/ Soil Type 5 | 12 | L (1) | - |
| | | 12.1-13.3 | I | L (3) | - | Have Access/ Soil Type 5 | - | - | - |
| | | 13.3-17.5 | I | M/L (5) | Yes | Have Access/ Soil Type 5 | 12 | L (1) | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 12.9 | 0.0- 5.9 | I | L (.5) | - | Sufficient Access/ Soil Types 4 and 6 | - | - | - | - |
| | | 5.9- 7.3 | I | N (0) | - | Sufficient Access/ Soil Type 7 | - | - | - | - |
| | | 7.3-12.9 | I | L (.5) | - | Sufficient Access/ Soil Type 4 | - | - | - | - |
| 9 | 25.0 | 0.0- 0.3 | I | L (.5) | - | Upgrade Access/ Soil Type 4 | - | - | - | - |
| | | 0.3- 6.2 | I | L/N (.1) | - | Upgrade Access/ Soil Type 5 | - | - | - | - |
| | | 6.2-24.4 | I | L (.5) | - | Upgrade Access/ Soil Type 4 | - | - | - | - |
| | | 24.4-25.0 | I | L/N (.1) | - | Upgrade Access/ Soil Type 5 | - | - | - | - |
| 10 | 19.9 | 0.0- 0.3 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 (cont.) | | 0.3- 7.8 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 7.8- 9.0 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |
| | | 9.0-19.9 | I | L (.5) | - | Upgrade Access/ Soil Type 4 | - | - | - | - |
| 11 | 20.5 | 0.0- 6.8 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |
| | | 6.8- 9.1 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 9.1-12.5 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |
| | | 12.5-13.2 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 13.2-16.3 | I | M/L (5) | Yes | New Access/ Soil Type 6 | 12 | L (1) | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 11 (cont.) | | 16.3-20.5 | I | L (.5) | - | New Access/ Soil Type 1 (high short-term impact) | - | - | - | - |
| 12 | 4.9 | 0.0- 4.3 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |
| | | 4.3- 4.9 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| 13 | 10.6 | 0.0- 1.2 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 1.2- 7.0 | I | L (.5) | - | Sufficient Access/ Soil Type 4 | - | - | - | - |
| | | 7.0- 7.5 | I | L (.5) | - | Upgrade Access/ Soil Type 4 | - | - | - | - |
| | | 7.5- 8.3 | I | L/N (0) | - | Upgrade Access/ Soil Type 5 | - | - | - | - |
| | | 8.3-10.6 | I | L (.5) | - | Upgrade Access/ Soil Types 4 and 6 | - | - | - | - |

Table 3.10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Mitigation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 11 (cont'd) | | 16.3-20.5 | I | L (5) | - | New Access/ Soil Type 1 (high short-term impact) | - | - | - | - |
| 12 | 3.9 | 0.0- 4.3 | I | M/L (3) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |
| | | 4.3- 6.9 | I | L (5) | - | New Access/ Soil Type 5 | - | - | - | - |
| 13 | 18.6 | 0.0- 1.2 | I | M (9) | - | Sufficient Access/ Soil Type 3 | - | - | - | - |
| | | 1.2- 7.0 | I | L (5) | - | Sufficient Access/ Soil Type 4 | - | - | - | - |
| | | 7.0- 7.5 | I | L (5) | - | Upgrade Access/ Soil Type 4 | - | - | - | - |
| | | 7.5- 8.7 | I | L/M (9) | - | Upgrade Access/ Soil Type 5 | - | - | - | - |
| | | 8.7-10.6 | I | L (3) | - | Upgrade Access/ Soil Types 4 and 6 | - | - | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 14 | 4.9 | 0.0- 4.9 | I | L (.5) | - | New Access/ Soil Type I (high short-term impact) | - | - | - | - |
| 15 | 5.0 | 0.0- 0.8 | I | L (.5) | - | New Access/ Soil Type I (high short-term impact) | - | - | - | - |
| | | 0.8- 2.4 | I | L (.5) | - | New Access/ Soil Type 5 (Type 3 at Mileposts 1.6 and 2.0) | - | - | - | - |
| | | 2.4- 2.8 | I | L (.5) | - | New Access/ Soil Type 3 (high short-term impact) | - | - | - | - |
| | | 2.8- 3.4 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 3.4- 5.0 | I | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (1) | - | - |

Table 4-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 8.6 | 0.0- 8.6 | I | L (.5) | - | Upgrade Access/ Soil Types 2, 4 and 6 (Type 5 at Mileposts 6.9 and 7.5) | - | - | - | - |
| 17 | 5.3 | 0.0- 0.9 | I | L (.5) | - | New Access/ Soil Type 1 (high short-term impact) | - | - | - | - |
| | | 0.9- 2.7 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |
| | | 2.7- 3.3 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 3.3- 5.3 | I | M/L (5) | Yes | New Access/ Soil Types 4 and 6 (high short-term impact) | 12 | L (1) | - | - |
| 18 | 3.7 | 0.0- 3.7 | I | L (.5) | - | Upgrade Access/ Soil Type 6 | - | - | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Milepoints | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Reason-nable Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 3.6 | 0.0- 3.6 | I | L (.5) | - | Upgrade Access/ Soil Types 2, 4 and 6 (Type 5 of Milepoints 6.9 and 7.5) | - | - | - | - |
| 17 | 5.3 | 0.0- 0.3 | I | L (.5) | - | New Access/ Soil Type 1 (high short-term impact) | - | - | - | - |
| | | 0.3- 2.7 | I | ML (5) | Yes | New Access/ Soil Type 6 | 12 | L (1) | - | - |
| | | 2.7- 3.3 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 3.3- 5.3 | I | ML (5) | Yes | New Access/ Soil Types 4 and 6 (high short-term impact) | 12 | L (1) | - | - |
| 18 | 3.7 | 0.0- 3.7 | I | L (.5) | - | Upgrade Access/ Soil Type 6 | - | - | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 19 | 7.9 | 0.0- 4.8 | I | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (1) | - | - |
| | | 4.8- 5.0 | I | L (.5) | - | New Access/ Soil Type 3 (high short-term impact) | - | - | - | - |
| | | 5.0- 5.3 | I | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (1) | - | - |
| | | 5.3- 5.5 | I | L (.5) | - | New Access/ Soil Type 3 (high short-term impact) | - | - | - | - |
| | | 5.5- 7.9 | I | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (1) | - | - |
| 20a | 21.0 | 0.0- 4.5 | I | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L+ (1) | - | - |
| | | 4.5- 5.6 | I | L (.5) | - | New Access/ Soil Type 3 | - | - | - | - |
| | | 5.6- 5.9 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L+ (1) | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 20a (cont.) | | 5.9- 7.6 | I | L (.5) | - | New Access/ Soil Type 3 | - | - | - | - |
| | | 7.6- 9.0 | I | M/L (5) | Yes | New Access/ Soil Type 2 | 12 | L+ (1) | - | - |
| | | 9.0-10.9 | I | L (.5) | - | New Access/ Soil Type 7 | - | - | - | - |
| | | 10.9-21.0 | I | M/L (5) | Yes | New Access/ Soil Types 2, 4 and 6 | 12 | L+ (1) | - | - |
| 20b | 17.9 | 0.0- 2.7 | I | L (.5) | - | Upgrade Access/ Soil Type 4 | - | - | - | - |
| | | 2.7- 3.8 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L+ (1) | - | - |
| | | 3.8- 4.1 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 4.1- 7.8 | I | M/L (5) | Yes | New Access/ Soil Type 4 and 6 | 12 | L+ (1) | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Milepost | Impact Type | Initial Long-Term Impact Level | Significant? | Impact Description | Residual Long-Term Impact Level | Significant (Irreversible/Irretrievable Adverse Impact Level) |
|---|---|---|---|---|---|---|---|---|
| 20c (cont.) | | 5.9- 7.6 | I | L (.5) | - | Farm Access/ Soil Type 1 | - | - |
| | | 7.6- 9.0 | I | MIL (5) | Yes | Farm Access/ Soil Type 2 | L+ (1) | - |
| | | 9.0-10.9 | I | L (.5) | - | Farm Access/ Soil Type 2 | - | - |
| | | 10.9-11.0 | I | MIL (5) | Yes | Farm Access/ Soil Types 2, 4 and 6 | L+ (1) | - |
| 20b | 17.3 | 0.0- 2.7 | I | L (.5) | - | Farm Access/ Soil Type 4 | - | - |
| | | 2.7- 3.3 | I | MIL (5) | Yes | Farm Access/ Soil Type 4 | L+ (1) | - |
| | | 3.3- 4.1 | I | L (.5) | - | Farm Access/ Soil Type 5 | - | - |
| | | 4.1- 7.3 | I | MIL (5) | Yes | Farm Access/ Soil Type 4 and 6 | L+ (1) | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 20b (cont.) | | 7.8- 8.4 | I | L (.5) | - | Upgrade/Soil Types 4 and 6 | - | - | - | - |
| | | 8.4-10.3 | I | L (.5) | - | Upgrade Access/ Soil Type 5 | - | - | - | - |
| | | 10.3-10.8 | I | L (.5) | - | Upgrade Access/Soil Type 3 (high ST impacts) | - | - | - | - |
| | | 10.8-17.9 | I | L (.5) | - | Upgrade Access/ Soil Type 4 | - | - | - | - |
| 21a | 6.0 | 0.0- 6.0 | I | L (.5) | - | Sufficient Access/ Soil Types 2, 4 and 6 | - | - | - | - |
| 21b | 8.0 | 0.0- 7.5 | I | L (.5) | - | Sufficient Access/ Soil Types 2, 4 and 6 | - | - | - | - |
| | | 7.5- 8.0 | I | L (.5) | - | Sufficient Access/ Soil Type 1 (high short-term impact) | - | - | - | - |
| 22 | 21.1 | 0.0-19.7 | I | L (.5) | - | Upgrade Access/ Soil Types 4 and 6 | - | - | - | - |

Table 3-18 (continued)
Project Assessment/Mitigation Planning Chart
Soil Erosion

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 22 (cont.) | | 19.7-21.1 | I | L (.5) | - | Upgrade Access/ Soil Type I (moderate short-term impact) | - | - | - | - |
| 23 | 13.8 | 0.0- 2.8 | I | L (.5) | - | Sufficient Access/ Soil Type I | - | - | - | - |
| | | 2.8-10.7 | I | L (.5) | - | Sufficient Access/ Soil Types 2, 4 and 6 | - | - | - | - |
| | | 10.7-11.1 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 11.1-12.5 | I | L (.5) | - | Sufficient Access/ Soil Types 4 and 6 | - | - | - | - |
| | | 12.5-13.8 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| 24a | 27.3 | 0.0- 0.6 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 0.6- 0.9 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 24a (cont.) | | 0.9- 1.9 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 1.9- 6.6 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |
| | | 6.6- 6.9 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 6.9-11.9 | I | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (1) | - | - |
| | | 11.9-12.1 | I | L (.5) | - | New Access/ Soil Type 1 (high short-term impact) | - | - | - | - |
| | | 12.1-12.4 | I | M/L (5) | Yes | New Access/ Soil Type 6 | 12 | L (1) | - | - |
| | | 12.4-14.3 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 14.3-14.7 | I | L (.5) | - | New Access/ Soil Type 1 (high short-term impact) | - | - | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Lake Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Reason-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 24a (cont.) | | 0.3- 1.9 | I | L (S) | - | Raw Access/ Soil Type 3 | - | - | - | - |
| | | 1.9- 5.6 | I | MLT (S) | Yes | Raw Access/ Soil Type 4 | I2 | L (U) | - | - |
| | | 5.6- 6.9 | I | L (S) | - | Raw Access/ Soil Type 5 | - | - | - | - |
| | | 6.9-11.9 | I | MLT (S) | Yes | Raw Access/ Soil Types 4 and 6 | I2 | L (U) | - | - |
| | | 11.9-12.1 | I | L (S) | - | Raw Access/ Soil Type 1 (high short-term impact) | - | - | - | - |
| | | 12.1-12.4 | I | MLT (S) | Yes | Raw Access/ Soil Type 6 | I2 | L (U) | - | - |
| | | 12.4-14.7 | I | L (S) | - | Raw Access/ Soil Type 5 | - | - | - | - |
| | | 14.7-14.7 | I | L (S) | - | Raw Access/ Soil Type 1 (high short-term impact) | - | - | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 24a (cont.) | | 14.7-16.7 | I | M/L (5) | Yes | New Access/ Soil Type 6 | 12 | L (1) | - | - |
| | | 16.7-17.0 | I | L (.5) | - | New Access/ Soil Type 1 (high short-term impact) | - | - | - | - |
| | | 17.0-17.6 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |
| | | 17.6-17.7 | I | L (.5) | - | New Access/ Soil Type 1 (high short-term impact) | - | - | - | - |
| | | 17.7-18.7 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |
| | | 18.7-23.0 | I | L (.5) | - | New Access/ Soil Type 1 (high short-term impact) | - | - | - | - |
| | | 23.0-27.1 | I | M/L (5) | Yes | New Access/ Soil Type 6 | 12 | L (1) | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Milepost | Impact Type | Initial Long-Term Impact Level | Significant Impact? | Proposed Description | Proposed Mitigation | Residual Long-Term Impact Level | Significant Impact? | Alternative Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 7Ns (cont.) | | 16.7-16.7 | I | MIL (5) | Yes | New Access/ Soil Type 6 | 12 | L (1) | - | - |
| | | 16.7-17.0 | I | L (3) | | New Access/ Soil Type 1 (High Short-term Impact) | - | - | - | - |
| | | 17.0-17.6 | I | MIL (5) | Yes | New Access/ Soil Type 7 | 12 | L (1) | - | - |
| | | 17.6-17.7 | I | L (1.5) | - | New Access/ Soil Type 1 (High Short-term Impact) | - | - | - | - |
| | | 17.7-18.1 | I | MIL (5) | Yes | New Access/ Soil Type 8 | 12 | L (1) | - | - |
| | | 18.1-21.0 | I | L (3) | - | New Access/ Soil Type 1 (High Short-term Impact) | - | - | - | - |
| | | 21.0-21.1 | I | MIL (5) | Yes | New Access/ Soil Type 6 | 12 | L (1) | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 24a (cont.) | | 27.1-27.3 | 1 | L (.5) | - | New Access/ Soil Type 1 (high short-term impact) | 12 | - | - | - |
| 24b | | | 1 | L (.5) | - | New Access/ Soil Type 1 (high short-term impact) | - | - | - | - |
| | | | 1 | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (1) | - | - |
| | | | 1 | L (.5) | - | New Access/ Soil Type 1 (high short-term impact) | - | - | - | - |
| 25 | 11.7 | 0.0- 0.4 | 1 | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 0.4- 0.6 | 1 | L (.5) | - | Sufficient Access/ Soil Type 4 | - | - | - | - |
| | | 0.6- 1.8 | 1 | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Item Number | Length | Milepost | Impact Type | Initial Long-Term Impact Level | Site-Specific Cost? | Impact Description | Revised Mitigation Option | Revised Long-Term Impact Level | Site-Specific Cost? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 24a (cont.) | | 77.1-77.7 | I | L (5) | - | (New Access/ Soil Type 1 High short-term impact) | 12 | - | - | - |
| 24b | | | I | L (5) | - | (New Access/ Soil Type 1 High short-term impact) | - | - | - | - |
| | | | I | M/L (5) | Yes | (New Access/ Soil Types 4 and 6 | 12 | L (1) | - | |
| | | | I | L (5) | - | (New Access/ Soil Type 4 High short-term impact) | - | - | - | |
| 25 | 11.7 | 0.0- 0.4 | I | H (0) | - | (Still-Use Access/ Soil Type 5 | - | - | - | |
| | | 0.4- 0.6 | I | L (3) | - | (Half-Open Access/ Soil Type 5 | - | - | - | |
| | | 0.6- 1.0 | I | H (0) | - | (Sufficient Access/ Soil Type 5 | - | - | - | |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 25 (cont.) | | 1.8-11.3 | I | L (.5) | - | Sufficient Access/ Soil Types 2 and 4 | - | - | - | - |
| | | 11.3-11.7 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| 26 | 0.6 | 0.0- 0.4 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 0.4- 0.6 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |
| 27 | 13.4 | 0.0- 0.8 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |
| | | 0.8- 1.8 | I | L/N (.1) | - | New Access/ Soil Type 5 | - | L | - | - |
| | | 1.8- 5.8 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |
| | | 5.8- 7.2 | I | L/N (.1) | - | New Access Soil Type 5 | - | - | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Milepostsa | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Hydrau-lically Mod-ified Mitiga-tion | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 25 (cont.) | | 1.8-11.3 | I | L (.5) | - | Southern Arroyo/ Soil Type 2 and 4 | - | - | - | - |
| | | 11.3-11.7 | I | N(0) | | Southern Arroyo/ Soil Type 5 | - | - | - | - |
| 26 | 0.6 | 0.0- 0.4 | I | L (.5) | - | New Arroyo/ Soil Type 5 | - | - | - | - |
| | | 0.4- 0.6 | I | M/L (5) | Yes | New Arroyo/ Soil Type 4 | 12 | L (1) | - | - |
| 27 | 13.6 | 0.0- 0.5 | I | M/L (5) | Yes | New Arroyo/ Soil Type 4 | 12 | L (1) | - | - |
| | | 0.5- 7.8 | I | L/M(1.1) | - | New Arroyo/ Soil Type 5 | - | L | - | |
| | | 7.8- 9.0 | I | M/L (5) | Yes | New Arroyo/ Soil Type 4 | 12 | L (1) | - | - |
| | | 9.0- 13.6 | I | L/M(1.1) | | New Arroyo Soil Type 5 | - | - | - | |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 27 (cont.) | | 7.2-10.0 | 1 | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (1) | - | - |
| | | 10.0-11.6 | 1 | L (.5) | - | Upgrade Access/ Soil Types 4 and 6 | - | - | - | - |
| | | 11.6-13.2 | 1 | L (.5) | - | Upgrade Access/ Soil Type 1 | - | - | - | - |
| | | 13.2-13.4 | 1 | L (.5) | - | Upgrade Access/ Soil Type 6 (moderate short-term impact) | - | - | - | - |
| 28 | 3.2 | 0.0- 2.1 | 1 | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (1) | - | - |
| | | 2.1- 3.2 | 1 | L (.5) | - | Sufficient Access/ Soil Types 4 and 6 | - | - | - | - |
| 29 | 2.1 | 0.0- 0.8 | 1 | L (.5) | - | New Access/ Soil Type 1 (high short-term impact) | - | - | - | - |
| | | 0.8- 2.1 | 1 | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (1) | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Line Number | Length | Milepoints | Impact Type | Initial Long-Term Impact Level | Significant? | Impact Description | Remaining-Mandatory Mitigation | Residual Long-Term Impact Level | Significant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 22 (cont.) | | 7.2-10.0 | I | M/L (S) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (I) | - | - |
| | | 10.0-11.6 | I | L (S) | - | Upgrade Access/ Soil Types 3 and 5 | - | - | - | - |
| | | 11.6-12.7 | I | L (S) | - | Upgrade Access/ Soil Type 1 | - | - | - | - |
| | | 12.7-13.3 | I | L (S) | - | Upgrade Access/ Soil Type 6 (moderate short-term impact) | - | - | - | - |
| 23 | 3.2 | 0.0- 3.1 | I | M/L (S) | Yes | New Access/ Soil Types 1 and 6 | 12 | L (I) | - | - |
| | | 3.1- 3.2 | I | L (S) | - | Sufficient Access/ Soil Types 1 and 6 | - | - | - | - |
| 24 | 3.1 | 0.0- 0.6 | I | L (S) | - | New Access/ Soil Type 1 (high short-term impact) | - | - | - | - |
| | | 0.6- 3.1 | I | M/L (S) | Yes | New Access/ Soil Types 1 and 6 | 12 | L (I) | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 2.1 | 0.0- 2.1 | I | L (.5) | - | Sufficient Access/ Soil Types 4 and 6 | - | - | - | - |
| 31 | 5.7 | 0.0- 5.7 | I | L (.5) | - | Sufficient Access/ Soil Type 4 | - | - | - | - |
| 32 | 16.4 | 0.0- 4.8 | I | L (.5) | - | Sufficient Access/ Soil Type 4 | - | - | - | - |
| | | 4.8- 5.0 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 5.0-11.2 | I | L (.5) | - | Sufficient Access/ Soil Type 4 (Type 5 at Milepost 6.5) | - | - | - | - |
| | | 11.2-11.6 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 11.6-12.2 | I | L (.5) | - | Sufficient Access/ Soil Type 4 | - | - | - | - |
| | | 12.2-14.4 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 32 (cont.) | | 14.4-15.3 | I | L (.5) | - | Sufficient Access/ Soil Type 1 | - | - | - | - |
| | | 15.3-16.4 | I | L (.5) | - | Sufficient Access/ Soil Type 6 | - | - | - | - |
| 33 | 15.5 | 0.0- 0.4 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 0.4- 5.0 | I | L (.5) | - | Sufficient Access/ Soil Type 4 | - | - | - | - |
| | | 5.0- 5.3 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 5.3- 6.5 | I | L (.5) | - | Sufficient Access/ Soil Type 4 | - | - | - | - |
| | | 6.5-11.0 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |
| | | 11.0-14.0 | I | L (.5) | - | Sufficient Access/ Soil Types 4 and 6 | - | - | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 33 (cont.) | | 14.0-14.7 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 14.7-14.9 | I | L (.5) | - | Sufficient Access/ Soil Type 1 | - | - | - | - |
| | | 14.9-15.5 | I | L (.5) | - | Sufficient Access/ Soil Type 6 | - | - | - | - |
| 34 | 1.4 | 0.0- 1.4 | I | L (.5) | - | Sufficient Access/ Soil Type 6 | - | - | - | - |
| 35 | 4.7 | 0.0- 4.7 | I | L (.5) | - | Sufficient Access/ Soil Types 4 and 6 | - | - | - | - |
| 36 | 5.8 | 0.0- 2.5 | I | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (1) | - | - |
| | | 2.5- 4.3 | I | L (.5) | - | Upgrade Access/ Soil Type 4 | - | - | - | - |
| | | 4.3- 5.8 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Line Item | Length | Milepost | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recommended Mitigation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 31 (cont.) | | 14.0-14.7 | I | M (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 14.7-14.9 | I | L (5) | - | Sufficient Access/ Soil Type 1 | - | - | - | - |
| | | 14.9-15.5 | I | L (7) | - | Sufficient Access/ Soil Type 6 | - | - | - | - |
| 34 | 1.4 | 0.0- 1.4 | I | L (7) | - | Sufficient Access/ Soil Type 6 | - | - | - | - |
| 35 | 3.7 | 0.0- 3.7 | I | L (5) | - | Sufficient Access/ Soil Types 7 and 6 | - | - | - | - |
| 36 | 5.5 | 0.0- 2.5 | A | MA (5) | Yes | Take Access/ Soil Types 6 and 4 | 12 | L (1) | - | - |
| | | 2.5- 4.1 | I | L (5) | - | Adequate Access/ Soil Type 4 | - | - | - | - |
| | | 4.1- 5.5 | I | MA (5) | Yes | Take Access/ Soil Type 4 | 12 | L (1) | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 7.3 | 0.0- 0.4 | I | L (.5) | - | New Access/ Soil Type I (high short-term impact) | - | - | - | - |
| | | 0.4- 1.3 | I | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (I) | - | - |
| | | 1.3- 3.2 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 3.2- 4.6 | I | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (I) | - | - |
| | | 4.6- 4.8 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 4.8- 6.2 | I | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (I) | - | - |
| | | 6.2- 6.6 | I | L (.5) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 6.6- 7.3 | I | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (I) | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Item Number | Length | Alternate | Impact Type | Initial Long Term Impact Level | Sig-nifi-cant? | Impact Description | Recommended Mitigation | Residual Long Term Impact Level | Sig-nifi-cant? | Significant Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 7.3 | 0.0- 0.8 | I | L (3) | - | New Access/ Soil Type 1 (high slope/short-term impact) | | | - | - |
| | | 0.8- 1.3 | I | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (1) | - | - |
| | | 1.3- 3.2 | I | L (3) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 3.2- 4.8 | I | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (1) | - | - |
| | | 4.8- 5.8 | I | L (3) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 5.8- 6.2 | I | M/L (5) | Yes | New Access/ Soil Type 5 | 12 | L (1) | - | - |
| | | 6.2- 6.6 | I | L (3) | - | New Access/ Soil Type 5 | - | - | - | - |
| | | 6.6- 7.3 | I | M/L (5) | Yes | New Access/ Soil Types 4 and 6 | 12 | L (1) | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 38 | 10.3 | 0.0- 0.8 | I | L (.5) | - | Sufficient Access/ Soil Type I | - | - | - | - |
| | | 0.8-10.3 | I | L (.5) | - | Sufficient Access/ Soil Types 2, 4 and 6 | - | - | - | - |
| 39 | 6.2 | 0.0- 0.3 | I | L (.5) | - | Sufficient Access/ Soil Type 6 | - | - | - | - |
| | | 0.3- 0.6 | I | N (0) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 0.6- 6.2 | I | L (.5) | - | Sufficient Access/ Soil Types 2, 4 and 6 | - | - | - | - |
| 40a | 6.2 | 0.0- 6.2 | I | L (.5) | - | Sufficient Access/ Soil Types 2, 4 and 6 | - | - | - | - |
| 40b | 4.9 | 0.0- 4.9 | I | L (.5) | - | Sufficient Access/ Soil Types 4 and 6 | - | - | - | - |
| 41 | 15.5 | 0.0-10.9 | I | L (.5) | - | Sufficient Access/ Soil Types 4 and 6 | - | - | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Milepost | Impact Type | Initial Long-Term Impact Level | Significant Adverse Impact | Impact Description | Mitigation Options | Residual Long-Term Impact Level | Significant Adverse Impact | Significant Unavoidable Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|
| 3B | 13.3 | 0.0- 0.8 | I | L (3) | - | Sufficient Access/ Soil Type 1 | - | - | - | - |
| | | 0.8-10.3 | I | L (3) | - | Sufficient Access/ Soil Types 3, 4 and 6 | - | - | - | - |
| 3C | 6.2 | 0.0- 0.3 | I | L (3) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 0.3- 0.6 | I | M (9) | - | Sufficient Access/ Soil Type 5 | - | - | - | - |
| | | 0.6- 6.2 | I | L (3) | - | Sufficient Access/ Soil Types 2, 4 and 5 | - | - | - | - |
| 5Da | 6.2 | 0.0- 6.2 | I | L (3) | - | Sufficient Access/ Soil Types 3, 4 and 6 | - | - | - | - |
| 4Db | 6.9 | 0.0- 6.9 | I | L (3) | - | Sufficient Access/ Soil Types 4 and 6 | - | - | - | - |
| 4A | 16.5 | 0.0-16.5 | I | L (3) | - | Sufficient Access/ Soil Types 4 and 6 | - | - | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 41 (cont.) | | 10.9-11.5 | 1 | L (.5) | - | Sufficient Access/ Soil Type 1 | - | - | - | - |
| | | 11.5-13.8 | 1 | L (.5) | - | Sufficient Access/ Soil Type 6 | - | - | - | - |
| | | 13.8-14.1 | 1 | L (.5) | - | Sufficient Access/ Soil Type 1 | - | - | - | - |
| | | 14.1-15.5 | 1 | L (.5) | - | Sufficient Access/ Soil Type 6 | - | - | - | - |
| 42 | 21.9 | 0.0- 2.4 | 1 | M/L (5) | Yes | New Access/ Soil Type 4 | 12 | L (1) | - | - |
| | | 2.4-17.2 | 1 | L (.5) | - | Upgrade Access/ Soil Types 4 and 6 | - | - | - | - |
| | | 17.2-17.4 | 1 | L/N (0) | - | Upgrade Access/ Soil Type 5 | - | - | - | - |
| | | 17.4-21.9 | 1 | L (.5) | - | Upgrade Access/ Soil Types 2 and 6 | - | - | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning (Cont.)
Soil Erosion

| Link Number | Length | Milepoints | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recommended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 41 (cont.) | | 10.9-11.5 | I | L (3) | - | Sufficient Access/ Soil Type 1 | - | - | - | - |
| | | 11.5-12.2 | I | L (3) | - | Sufficient Access/ Soil Type 6 | - | - | - | - |
| | | 12.8-13.1 | I | L (3) | - | Sufficient Access/ Soil Type 1 | - | - | - | - |
| | | 13.1-13.5 | I | L (3) | - | Sufficient Access/ Soil Type 6 | - | - | - | - |
| 42 | 21.7 | 0.0-2.4 | I | M/L (5) | Yes | New Access/ Soil Type 6 | 12 | L (1) | - | - |
| | | 2.4-12.2 | I | L (3) | - | Upgrade Access/ Soil Types 3 and 6 | - | - | - | - |
| | | 12.2-12.4 | I | L/M (10) | - | Upgrade Access/ Soil Type 3 | - | - | - | - |
| | | 12.5-21.7 | I | L (3) | - | Upgrade Access/ Soil Types 2 and 6 | - | - | - | - |

Table 3-10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 43 | 3.9 | 0.0- 0.2 | I | L (.5) | - | New Access/ Soil Type 1 (high short-term impact) | - | - | - | - |
| | | 0.2- 3.9 | I | M/L (5) | Yes | New Access/ Soil Types 2, 4 and 6 | 12 | L (1) | - | - |
| 44 | 16.2 | 0.0- 3.4 | I | L (.5) | - | Upgrade Access/ Soil Type 4 | - | - | - | - |
| | | 3.4- 7.0 | I | M/L (5) | Yes | New Access/Soil Type 4 | 12 | L (1) | - | - |
| | | 7.0-16.2 | I | M/L (5) | Yes | New Access/Soil Types 4 and 5 | 12 | L (1) | - | - |
| 45 | 5.7 | 0.0- 5.7 | I | M/L (5) | Yes | New Access/Soil Types 2 and 4 | 12 | L (1) | - | - |

Table 3.10 (continued)
Impact Assessment/Mitigation Planning Chart
Soil Erosion

TABLE 3-11
IMPACT ASSESSMENT/MITIGATION PLANNING CHART
PALEONTOLOGICAL RESOURCES

| Link Number | Length | Mileposts | Impact Type | Initial Long-Term Impact Level | Sig-nifi-cant? | Impact Description | Recom-mended Miti-gation | Residual Long-Term Impact Level | Sig-nifi-cant? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 83.3 | 79.7-82.0 | 2 | N (.1) | - | Sufficient Access/ possible fossil-bearing strata | - | - | - | - |
| 18 | 3.7 | 0.5- 3.7 | 2 | M/L (5) | Yes | Upgrade Access/ possible late Pleisto-cene vertebrate fossils in lake deposits | 12A | L (1) | No | - |
| 19 | 7.9 | 0.0- 0.8 | 2 | H/M (11) | Yes | New Access/ possible late Pleisto-cene vertebrate fossils in lake deposits | 12A | M/L (5) | No | - |
| 20b | 17.9 | 2.0- 2.7 | 2 | L (.5) | - | Upgrade Access/ possible fossil-bearing strata | - | - | - | - |
| | | 2.7- 3.0 | 2 | M/L (5) | Yes | New Access/possible fossil-bearing strata | 12A | L (1) | No | - |
| 22 | 21.1 | 0.0- 2.0 | 2 | M/L (5) | Yes | Upgrade Access/ possible late Pleisto-cene vertebrate fossils in lake deposits | 12A | L (1) | No | - |

TABLE 3-11
IMPACT ASSESSMENT/MITIGATION PLANNING CHART
PALEONTOLOGICAL RESOURCES

| Link Number | Length | Milepoints | Impact Type | Initial Long-Term Impact Level | Significant mitigation exist? | Impact Description | Mitigation Measures | Residual Long-Term Impact Level | Significant mitigation exist? | Significant Unavoidable Adverse Impact Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 83.3 | 79.7-83.0 | 2 | M(1) | - | Sufficient A. casz possible fossil-bearing strata | - | - | - | - |
| 18 | 3.7 | 0.5- 3.7 | 2 | M(1, S) | Yes | Adequate recovery possible into Pleistocene vertebrate fossils in lake deposits | 12A | L (1) | No | - |
| 19 | 2.9 | 0.0- 0.9 | 2 | M(1A)(1) | Yes | Adequate recovery possible into Pleistocene vertebrate fossils in lake deposits | 12A | M(L (S) | No | - |
| 20a | 17.9 | 2.0- 2.7 | 2 | L (S) | - | Adequate recovery possible into fossil-bearing strata | - | - | - | - |
| | 2.7- 3.0 | | 2 | M(1) | Yes | Adequate recovery possible into fossil-bearing strata | 12A | L (1) | No | - |
| 22 | 21.1 | 0.0- 2.0 | 2 | M(1) | Yes | Adequate recovery possible into Pleistocene vertebrate fossils in lake deposits | 12A | L (1) | No | - |

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# CHAPTER 4
# BIOLOGICAL RESOURCES

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# CHAPTER 4
# BIOLOGICAL RESOURCES

## INTRODUCTION

The Los Angeles Department of Water and Power (DWP), a member of the Southern California Public Power Authority (SCPPA), together with other participants, proposes to construct, operate and maintain a 500kV transmission line from the Mead or McCullough Switching Station near Boulder City, Nevada, to the Victorville or Adelanto Switching Station in California. This report presents results of technical studies on the biological resources that could potentially be affected by the proposed project.

## STUDY APPROACH AND METHODS

The proposed project extends across more than 150 miles of biological habitats in the Mojave Desert of California and Nevada. The large areal extent of the proposed project required that numerous biological resources be examined. These resources varied greatly in type, location, abundance and sensitivity due in part to the wide geographic range of the project. As a result, a two-level method of analysis was utilized to summarize and describe biological resources that could be affected by the project. A regional-level analysis was conducted by identifying important biological resources near the alternative corridors. A regional study area was defined using an approximate 10-mile-wide zone surrounding all alternative corridors. Biological resources within this study area were identified and briefly described in tables, texts and figures, based on available data in scientific literature, environmental documents, personal communications from knowledgeable persons, and files from the California and Nevada Bureau of Land Management (BLM). Regional information developed for the study area provided a background and context in which to interpret and evaluate the occurrence and importance of biological resources within the alternative corridors.

Once the regional-level study was completed, a site-specific analysis of biological resources within and adjacent to the alternative corridors was conducted. A two-mile-wide study corridor centered on the proposed routes was examined using recent aerial photography and field reconnaissance of all corridors. Site-specific information was collected, mapped at a large scale, tabulated by milepost, and summarized in this report.

Biological resources examined in this study include the following: (1) native vegetation types; (2) common and characteristic reptiles, amphibians, birds and mammals; (3) legally protected species designated rare, threatened or endangered by the Federal or state governments; (4) species of special interest which have limited legal status, but are of concern to agencies and the interested public; and (5) areas of special biological interest.

The proposed transmission line follows several major existing corridors which have undergone previous environmental review, including the Interstate 15

(I-15) corridor (Woodward-Clyde 1979; BLM 1980a; Jones & Stokes 1980) and the Intermountain Power Project (IPP) corridor (BLM 1979). In addition, biological resources of the California Mojave Desert were studied by BLM to develop the California Desert Conservation Area (CDCA) Plan (BLM 1980b). Detailed background data to develop the CDCA Plan are on file at the California Desert District Office in Riverside (BLM 1984). Under the direction of Mr. Larry Foreman, Desert District Biologist of BLM, these files were used as major data sources for this technical study. As a result of the previous studies and existing BLM data, there is extensive information on biological resources in the study area and, in certain cases, along the specific alternative transmission line corridors.

Field surveys of the proposed transmission line corridors were conducted between November 30 and December 8, 1984 by two 2-man teams of biologists. Each team was equipped with a four-wheel drive vehicle and was able to access all but the most remote, high elevation corridors due to the availability of existing access roads and nearby highways. During the field surveys, all vegetation types within one mile of the centerline were mapped. All important observations of plant and animal life, particularly of legally protected and special interest species, were recorded. All field data were recorded on U.S Geological Survey (USGS) 7.5- and 15-minute quad maps; photographic slides were taken periodically.

Due to the season of the year, biological activity of most animals in the Mojave Desert was low. In addition, spring and summer flowering herbs and grasses were not identifiable. Hence, observation of many species in the field such as desert tortoise, winter bird visitors, most reptiles, and many rare plants were limited. However, the abundance of previous investigations have provided important seasonal data that are mostly sufficient for purposes of an impact assessment. Where additional data are required to complete the impact assessment or refine the mitigation planning, limited field surveys in the appropriate season will be recommended.

## STUDY PERSONNEL

This study was directed by Dr. John T. Gray, a Project Ecologist with Dames & Moore, Santa Barbara. Dr. Gray has over five years experience conducting and directing biological inventory, impact assessment, and mitigation planning studies for environmental documents in California and Nevada. Dr. Gray was responsible for the study design, supervising the literature review, developing rare plant information, directing the field survey efforts, summarizing data for the report, and the final compilations, editing and production of the report.

The literature review, field surveys, and initial data summary were conducted by the biological consulting firm Consultants in Wildlife and Environmental Services Agency (CWESA) of Fresno, under subcontract and supervision of Dames & Moore. CWESA staff members involved in the study include Mr. Bill Clark (M.A., biology; wildlife and botany), Mr. Curt Uptain (M.A., biology; wildlife and vegetation), and Mr. Stephen Juarez (B.A., biology; wildlife and

avifauna). CWESA staff has extensive experience in conducting biological field surveys in southern California, including the Mojave Desert. CWESA is currently involved in mitigation surveys along the IPP corridor in Utah and Nevada for rare plants and desert tortoise.

## STUDY AREA OVERVIEW

The biological resources of the study area are described in the following sections. The study area includes all alternative routes with an area of approximately 10 miles on either side of each route. Detailed maps of biological resources in the study area are available for review at the Dames & Moore offices in Phoenix, Arizona. Generalized vegetation and wildlife data are shown on Figures 4-2 and 4-3, respectively, in the accompanying Map Volume.

### Vegetation Types

The vegetation of the study area can be classified into eight different types, primarily based on the physical characteristics of the vegetation and the dominant plant species. The classification, regional distribution, and dominant species of each vegetation type in the study area are briefly described below. The vegetation types are defined following the classification systems of Cheatham and Haller (1975), Munz (1974), and Thorne (1976) for California; and Beatley (1976), Brown (1982), and Bensen and Darrow (1983) for Nevada.

Data on the species composition and regional distribution of each vegetation type were developed from: (1) a review of scientific literature and desert floras (Munz 1974; Thorne 1976; Beatley 1976; Vasek and Barbour 1977; Brown 1982; Thorne et al. 1981; DeDecker 1984); (2) previous botanical field surveys along the I-15 corridor (Woodward-Clyde 1979; BLM 1980a), IPP corridor (BLM 1979; Schultz 1982, 1984), Ivanpah generating station site (Southern California Edison (SCE) 1981), Barstow-to-Las Vegas motorcycle race course (BLM 1974), and the BLM CDCA Plan (BLM 1980b) and supporting in-house documents (BLM 1984); (3) field reconnaissance surveys of the alternative corridors described previously; and (4) a review of 1981-1984 black-and-white aerial photography (1:10,000 scale) of the alternative corridors.

Common and characteristic plant species of each vegetation type are listed in Table 4-1. The distribution of each vegetation type in the study area was mapped, based on regional vegetation maps from Kuchler (1977) and Brown (1978). The distribution of vegetation types along each corridor is presented later in this report under Biological Resources Within and Adjacent to Alternative Corridors.

Vegetation types consist of associations of plant species that vary with environmental conditions such as soil type, slope, exposure, moisture availability, and disturbance. The study area includes a wide variety of soils, parent material, and topographic features. Although most of the study area is

dominated by a single vegetation type (creosote bush scrub), there are many local vegetation patterns that reflect the complex environmental factors. In most instances, these factors result in a change in species composition, with little or no change in the physiognomy and appearance of the vegetation which is primarily scrub.

Much of the vegetation in the study area has not been disturbed, particularly at higher elevations. However, manmade disturbances occur near Victorville, Barstow, and other built-up areas due to manmade structures, roads, and agricultural activities; the latter is primarily restricted to irrigated farmlands in the Mojave River Valley. Cattle grazing occurs over a large portion of the study area. Off-road vehicle use is regulated on BLM land and is generally restricted to specified roads and recreation areas; however, road scars are scattered throughout the study area, excluding the higher mountain ranges.

### Creosote Bush Scrub

Creosote bush scrub occurs on well drained, nonalkaline soils of sandy flats, bajadas, alluvial fans, and upland slopes throughout most of the Mojave Desert. It is absent from dry lake bottoms or valley floors with alkaline or dense soils. It is poorly developed on rocky outcrops, steep slopes, or in washes. Creosote bush scrub generally occurs below 4,000 feet elevation, above which it is replaced by Joshua tree woodland or blackbush scrub.

Creosote bush scrub consists of widely spaced, even-sized creosote bush (*Larrea tridentata*) shrubs with various smaller shrubs distributed in the open spaces. Burrobush (*Ambrosia dumosa*) is a small shrub that is a common codominant of creosote bush scrub throughout most of the Mojave Desert. A large number of low-growing winter annual herbs may appear in the spring, depending on the timing and amount of rainfall.

The density and species composition of creosote bush scrub varies considerably throughout the Mojave Desert due to the influence of topography, climate and soils. For example, on lower bajadas with finer soil textures and greater temperature extremes, *Larrea* may be the only conspicuous plant. On higher bajadas with better cold air drainage and coarser soils with more microsites, a phase of creosote bush scrub occurs that is rich in shrub, cacti, and annual species.

In the central Mojave Desert, creosote bush scrub is mostly codominated by *Larrea* and burrobush. Other subordinate species include species of saltbush (*Atriplex* spp.), cheeseweed (*Hymenoclea salsola*), boxthorn (*Lycium andersonii*), Mormon tea (*Ephedra* spp.), cassia (*Cassia armata*), brittlebush (*Encelia farinosa*), pencil cholla (*Opuntia ramosissima*), and Mojave yucca (*Yucca schidigera*).

In the study area, creosote bush scrub is the dominant vegetation type, occurring on most flats, bajadas, and gentle slopes.

## Saltbush Scrub

This vegetation type is often referred to as alkali sink scrub and consists of a low scattered scrub occurring in valley floors, basins, sinks and playas below 4,000 feet elevation. It is dominated by low-growing, scattered halophytic shrubs from the Chenopodiaceae. This vegetation type occupies habitats of extreme aridity, either due to physical factors or soil chemical properties. Two phases of saltbush develop under these conditions. The first is called the xerophytic phase. It occurs on lower bajadas, in basins, or around margins of playas and is characterized by extremely dry soils. It is dominated by shrubs with limited salt tolerance, including all-scale (Atriplex polycarpa), shadscale (A. confertifolia), four-wing saltbush (A. canescens), and desert holly (A. hymenelytra). The halophytic phase is found on saline or alkali soils of playas, in sinks, or near seeps where available surface or ground water is high in mineral content. Important halophytic species in this phase include pickleweed (Allenrolfea occidentalis), glasswort (Salicornia spp.), seep weed (Sueada spp.), and greasewood (Sarcobatus vermiculatus). Gradients between the halophyte and xerophytic scrub often occur around dry lakes with halophytic species in the playa being replaced by xerophytic species around the margins. Saltbush scrub is generally replaced at higher elevations by creosote bush scrub throughout its range.

The xerophytic phase of saltbush scrub is widely distributed over the Mojave Desert, often forming extensive stands dominated by all-scale, particularly in the western Mojave Desert. Halophytic saltbush scrub is also widely distributed, but restricted to special habitats determined by local topographic conditions.

In the study area, several major basins with dry or existing lakes support both saltbush scrub phases, including Jean Dry Lake, Eldorado Valley, and Hidden Valley in Nevada; and Ivanpah Valley (includes Roach and Ivanpah dry lakes), Soda and Silver lakes and surrounding terrain, Red Pass Lake, East and West Cronese dry lakes, Coyote Lake, Troy Lake, and Harper Dry Lake in California. Extensive areas with scattered stands of xerophytic saltbush scrub dominated by all-scale is present in the western portions of the study area near Kramer Junction.

## Blackbush Scrub

Blackbush scrub is a low dark monotonous scrub vegetation dominated by blackbush (Coleogyne ramosissima), sometimes in pure stands. It occurs on shallow, rocky or gravelly, usually calcareous soils of flats, mesas, or relatively steep upper bajadas. Blackbush scrub is found above Joshua tree woodland and creosote bush scrub of California and sagebrush scrub in Nevada. It occurs at elevations of 3,500 to 5,000 feet and is excluded from basins.

Although the species richness of blackbush scrub is lower than creosote bush scrub, it contains many subordinate species whose occurrences vary greatly depending on local environmental conditions. In southern Nevada, common

associated species include Spanish bayonet (Yucca baccata), turpentine bush (Thamnosma montana), hopsage (Grayia spinosa), winter fat (Eurotia lanata), bud sagebrush (Artemisia spinescens), Utah agave (Agave utahensis), and species of Ephedra, Dalea, Atriplex and Tetradymia. In this area, blackbush scrub may contain floristic elements of the Great Basin Desert such as Artemisia spp. and as such is considered a transitional community.

Blackbush scrub occurs in small localized areas at higher elevations in the study area. It is particularly well developed above 7,000 feet in the Clark, McCullough and Spring mountains near the California-Nevada border, and in small areas in the Avawatz, Ord and Granite mountains in the western portion of the study area.

**Joshua Tree Woodland**

Joshua tree woodland is a scrub vegetation consisting of a Joshua tree (Yucca brevifolia) overstory and an understory of various shrubs and perennial herbs. It is not a true woodland because the trees are widely spaced and contribute only a small percentage of the community biomass. However, the unusual shape and size of Joshua trees makes them a conspicuous element of the vegetation.

Joshua tree woodland occurs on well drained, loose, sandy or gravelly soils of mesas and gentle slopes at 2,500 to 5,000 feet elevation. It typically occurs between creosote bush scrub and pinyon-juniper woodland, grading into each adjacent vegetation type. Joshua tree woodland is found in the same elevational zone as blackbrush scrub; however, the latter usually occurs on rocky, steep slopes with heavier soils. Joshua tree woodland outlines the geographic extent of the Mojave Desert in California and Nevada, occurring along the lower slopes of the bordering mountains, particularly along the western margins and the base of the San Bernardino Mountains. It also occurs in smaller stands at higher elevation slopes within the central portions of the Mojave Desert.

A wide variety of species occurs as an understory to Joshua tree woodland throughout its range, including creosote bush, burrobush, Mormon tea, littleleaf ratany (Krameria parvifolia), cheeseweed, hopsage, boxthorn, blackbush, spinn menodora (Menodora spinescens), Mojave yucca, various cacti such as silver cholla (Opuntia echinocarpa), pencil cholla, and barrel cactus (Ferocactus acanthoides), and several grass species such as galleta grass (Hilaria rigida) and bush muhly (Muhlenbergia porteri).

In the study area, Joshua tree woodlands are well developed between 3,500 and 4,500 feet on the Clark Mountains, portions of Shadow Valley, near Halloran Springs, and in localized areas near the McCullough Mountains. Scattered Joshua trees also occur in the Shadow Mountains, Kramer Hills, and near Adelanto in the western portion of the study area.

### Pinyon-Juniper Woodland

Pinyon-juniper woodland is dominated by two small coniferous trees - pinyon pine (Pinus monophylla) and Utah juniper (Juniperus osteosperma) - interspersed with a large number of smaller shrubs, cacti, and perennial herbs. It typically is found above 4,500 feet elevation on rocky or gravelly, well drained soils. It is the dominant high elevation vegetation of the major mountain areas in the Mojave Desert of California and Nevada.

The flora of pinyon-juniper woodland is relatively rich in species compared to lower elevation desert scrub vegetation types. Common species include Great Basin sagebrush (Artemisia tridentata), blackbush, Mormon tea, apache plume (Fallugia paradoxa), matchweed (Gutierrezia sarothrae), boxthorn, grizzly bear cactus (Opuntia erinacea), turpentine bush, and Spanish bayonet.

In the study area, pinyon-juniper woodland is present between 4,800 and 5,200 feet on Clark Mountain, and at similar elevations in the Ivanpah and McCullough mountains.

### Desert Wash Scrub and Woodland

This azonal vegetation type consists of the aggregation of plants found in the sandy bottoms of wide canyons, in incised arroyos of upper bajadas, and in the sandy, shallow washes of lower bajadas. It is closely associated with creosote bush scrub and occurs mostly below 4,500 feet elevation. Numerous minor desert washes occur throughout the lower and middle elevations of the Mojave Desert. Most are dominated by cheeseweed, although many other species may also be important, including matchweed, Mormon tea, bladder sage (Salazaria mexicana), desert almond (Prunus fasciculata), and little-leaf ratany. Cheeseweed is the most common and characteristic dominant species of this vegetation type. The occurrence of desert wash scrub in the study area is too localized and widespread to map at a regional scale.

Desert wash woodland (or microphyllous woodland) is poorly developed in the Mojave Desert compared to the Colorado Desert. It consists of dense to sparse thickets along washes with available underlying ground water. The woodland is dominated by one or more of the following species: cat claw (Acacia greggii), desert willow (Chilopsis linearis), palo verde (Cercidium floridum), smoke tree (Dalea spinosa), mesquite (Prosopis glandulosa), and the introduced tamarisk (Tamarix spp.).

Desert willow and mesquite stands in the study area are present at East and West Cronese lakes, near Soda Lake and the Mojave River Wash at Soda Springs, and along selected portions of the Mojave River from near Helendale to Soda Springs.

### Riparian Woodland

Riparian woodland consists of a dense thicket of shrubs and trees along a major river or stream channel with significant surface or subsurface flow to support woody vegetation. This vegetation type is only present in the study area along the upper reaches of the Mojave River from south of Victorville to near Helendale, and at Afton Canyon. Dominant plants include willow (Salix spp.), cottonwoods (Populus fremontii), and arroweed (Pluchia sericea). There is surface water in these portions of the river during much of the year. Other portions of the Mojave River consist of broad sandy wash areas as described above.

### Mojave Montane Forest

This vegetation type consists of small, highly restricted groves of Rocky Mountain white fir (Abies concolor ssp. concolor) mixed with Utah juniper and pinyon pine. These open woodlands occur on the steep north-facing slopes and narrow canyons of the higher ranges of the eastern Mojave Desert in California and southern Nevada. In the study area, it occurs in protected areas (65 hectares total) near the crest of Clark Mountain between 5,700 and 7,100 feet elevation. Species richness in this high elevation vegetation type is relatively poor; however, many unusual and highly restricted shrubs and perennial herbs are found in the Mojave montane forest.

## Wildlife

Four wildlife habitats can be identified in the study area based primarily on the structure and species composition of the vegetation type which provides food and shelter for resident and migratory wildlife. Each habitat supports a fairly well-defined assemblage of amphibians, reptiles, birds and mammals. However, due to the overlapping distribution of habitat types and the highly mobile nature of birds and mammals, there is considerable overlap in the distribution of wildlife species between each habitat.

In the following sections, the common and characteristic wildlife species in each habitat type are briefly described and are also listed in Table 4-2 (amphibians and reptiles), Table 4-3 (birds), and Table 4-4 (mammals). This information was developed primarily from scientific literature (BLM 1978; Karl 1984), natural history guides (Ingles 1965; Stebbins 1966; Garrett and Dunn 1981), extensive sighting records from the California and Nevada BLM files (BLM 1984), experience of the study team biologists, and observations during the field surveys.

### Scrub Habitat

The habitat consists of relatively homogenous, low-growing shrubs with or without interspersed herbs and grasses. It includes the vegetation types of

creosote bush, saltbush, and blackbush scrub. As a result, it occurs over a wide elevational range and in a variety of topographic situations throughout the study area. The habitat is relatively simple, with one or two dominant plant species, low cover, and scarce water resources. It is the most common wildlife habitat in the study area.

## Amphibians and Reptiles

Amphibians are relatively scarce in the scrub habitat due to the absence of water. Couch's spadefoot toad may be found in some areas. It is a nocturnal species that is active after rains. During dry periods, it buries itself in loose soil or in rodent burrows.

Reptiles are more common in the scrub habitat, particularly lizards. Typical species include the western whiptail, side-blotched lizard, long-nosed leopard lizard, desert iguana, and desert horned lizard. Lizards in rocky areas of scrub habitat include the chuckwalla, collared lizard, and banded gecko. The desert night lizard is likely to occur under Joshua trees.

Common snakes of the scrub habitat include the glossy snake, gopher snake, coachwhip or red racer, and shovelnose snake. Less common but characteristic snakes of the scrub habitat are the rosy boa, patchnose snake, and night snake.

A distinctive snake of the scrub habitat is the sidewinder. This rattlesnake species is venomous; however, it is not as toxic as its close relative, the Mojave green rattlesnake. The latter species, which also occurs in scrub habitat, is larger than the sidewinder and is capable of inflicting a bite that causes more respiratory distress than any other North American pit viper.

## Birds

In general, the abundance and diversity of the scrub habitat avifauna are low. Birds are more common where the vegetation is profuse and in desert wash woodlands. Roadrunners are a common resident bird in the scrub habitat that hunt reptiles in the early morning. The most conspicuous bird is the common raven which nests in cliffs and hunts for prey and carrion over the broad desert expanses. Common resident songbirds include the horned lark, black-throated sparrow, and cactus wren. Costa's hummingbirds are a relatively common nesting summer visitor. Common birds of prey include the red-tailed hawk, golden eagle, and American kestrel.

## Mammals

Most mammals of the scrub habitat are nocturnal as a means of water conservation. Two notable exceptions are the common dwarf white-tailed antelope squirrel and black-tailed jackrabbit. Typical nocturnal mammals

include the Merriam's kangaroo rat, little pocket mouse, desert woodrat, and southern grasshopper mouse.

**Woodland Habitat**

This habitat consists of widely scattered trees with a sparse understory of shrubs, grasses and herbs. It includes the vegetation types of Joshua tree woodland and pinyon-juniper woodland. The former occurs throughout the study area, including scattered pockets of the western study area, in Shadow Valley, on Clark Mountain, and in the McCullough Mountains. Pinyon-juniper woodland is primarily restricted to the higher elevations of the Clark, Ivanpah, and south McCullough mountains. The woodland habitat provides greater food and structural complexity than the scrub habitat.

Amphibians and Reptiles

As in the scrub habitat, amphibians are relatively scarce due to the lack of significant surface water resources. Typical lizard species include the desert spiny lizard, desert night lizard, and Gilbert's skink. Common snakes are the desert night snake, regal ringneck snake, and Mojave green rattlesnake.

Birds

The woodland habitat supports a relatively abundant and varied avifauna due to the presence of trees and a diverse understory. Joshua trees are used for nests by Scott's orioles, cactus wrens, ash-throated flycatchers, and ladder-back woodpeckers. Other common birds of the woodland habitat include the scrub jay, red-shafted flicker, common poor-will, black-tailed gnatcatcher, western bluebird, pinyon jay, and mountain quail. Resident raptors nest in cliffs in or near the woodland habitat, including the raven, red-tailed hawk, golder eagle, and prairie falcon.

Mammals

The Yuma myotis and big brown bat are common bat species that utilize caves and rocky terrain in the woodland habitat. The Panamint kangaroo rat, canyon mouse, and pinyon mouse are common, mostly in pinyon-juniper woodlands. Common carnivores include the coyote, gray fox, and bobcat. Other important mammals include the ubiguitous mule deer and desert cottontail, as well as the less common desert bighorn sheep.

**Riparian and Wash Habitats**

This habitat consists of sparse to densely vegetated thickets and woodlands along stream channels. Well-developed riparian woodland is present along the

upper Mojave River from near Victorville to Helendale. This habitat is dominated by cottonwoods, willows and tamarisks. Along the lower Mojave River and in other areas of the Mojave Desert with seasonally standing or flowing water are desert wash woodland habitats. These are small localized areas dominated by mesquite, cat-claw, or desert willow. Both riparian and desert wash woodland habitats provide important habitat for a diverse and abundant herptogauna and avifauna due to its structural complexity, abundant cover and food, and availability of water.

Amphibians and Reptiles

Common amphibians along riparian and desert wash woodland areas include the leopard frog, red-spotted toad, and bullfrog. The desert spiny lizard commonly takes refuge in riparian habitats of the Mojave Desert. Zebra-tailed lizards and the Mojave fringe-toad lizards are also common residents of these habitats, particularly along sandy washes. Common snake species in these habitats include the rosy boa and western blind snake.

Birds

The riparian woodland habitat along the Mojave River and at Afton Canyon, as well as the scattered mesquite and desert willow thickets in the study area, support an abundant and diverse avifauna. A variety of resident, migratory, and winter visitor bird species occur in these habitats, such as the belted kingfisher, downy woodpecker, northern flicker, western flycatcher, black phoebe, western kingbird, bushtit, orange-crowned warbler, yellow-rumped warbler, western tanager, and lesser goldfinch, among others. Low-lying areas with seasonal standing water, such as at Harper Dry Lake, East Cronese Lake, and Soda Lake, provide a temporary stopover habitat for migratory waterfowl such as the black-bellied plover, willet, and western sandpiper.

Mammals

A variety of bats may be found in the riparian woodland habitat, including the fringe-tailed myotis. Virginia opossums, striped skunks, and the western harvest mouse are common mammals of these habitats.

**Montane Forest Habitat**

This habitat consists of a relatively small, isolated coniferous forest near the crest of Clark Mountain where pinyon-juniper woodland is mixed with a residual stand of Rocky Mountain white fir. This high elevation forest habitat provides year-round and seasonal habitat for a variety of wildlife. However, the small areal extent of this habitat limits the abundance of wildlife species.

### Amphibians and Reptiles

Characteristic species of this habitat include Gilbert's skink and the western skink. The pine-gopher snake is the most common snake in this habitat.

### Birds

Common birds of the Montane forest habitat include the western wood peewee, plain titmouse, bushtit, and scrub jay. Cooper's hawk is a common summer resident in this habitat. Other bird species commonly observed are the white-throated swift, mountain quail, and turkey vulture.

### Mammals

Deer mice occur in this habitat as well as in lower elevation habitats. Other common mammals include the Panamint chipmunk, pinyon mouse, and mule deer. Several bats reside in this habitat, including the fringed myotis, big brown bat, and spotted bat.

## Legally Protected Species

### Plants

Legally protected plants include species officially listed as rare and endangered by the California state government (California Department of Fish and Game (CDFG) 1984), critically endangered by the Nevada state government (Nevada Division of Forestry (NDF) 1984), or threatened and endangered by the Federal government (U.S. Fish and Wildlife Service (USFWS) 1984). The potential occurrence of these species in the study area was evaluated by a review of their regional distribution using regional floras (Munz 1974; Beatley 1976; Thorne et al. 1981; DeDecker 1984); California BLM data in the CDCA Plan (BLM 1980b) and supporting in-house data (BLM 1984; Albiston 1984); Nevada BLM data (Fisher 1980; Driver 1984); data from the California Native Plant Society (CNPS) and California Natural Diversity Data Base (CNDDB) 1984; data from the NDF (Murphy 1984); data from the Northern Nevada Native Plant Society (NNPS) (Mozingo and Williams 1980; Pinzl 1984); and previous botanical investigations along the I-15 and IPP transmission line corridors (BLM 1979; Woodward-Clyde 1979; BLM 1980a; Jones & Stokes 1980; Schultz 1982, 1984).

Based on these investigations, no legally protected plant species are known or likely to occur within the study area.

## Fish and Wildlife

Legally protected fish and wildlife include species listed as rare or endangered by the California and Nevada state governments (CDFG 1980, 1984; Nevada Department of Wildlife (NDW) 1984), or threatened and endangered by the Federal government (USFWS 1984).

Several wildlife species described below are listed as rare or endangered by the California or Nevada state governments, but do not have Federal status as a legally protected species. However, these species may be listed as candidates for Federal listing. Federal candidate species are assigned to one of two categories depending on the current state of knowledge of the species and its biological appropriateness for listing (USFWS 1980, 1983). Category 1 includes species for which the USFWS currently has on file substantial information on biological vulnerability and threats to support the appropriateness of proposing to list as endangered or threatened species. Category 2 includes species for which sufficient information is available to indicate possible listing, but for which additional data are required on vulnerability and threats. Species in these categories are usually given protection by BLM under the Endangered Species Act, pending the resolution of their official status (BLM 1980b).

### Mohave Tui Chub

The Mohave tui chub (*Gila bicolor mohavensis*) is designated an endangered species by the California state government (CDFG 1980) and Federal government (USFWS 1984). This species represents the only native fish of the Mojave River in California. It originated from a large Pleistocene lake and river system along the Mojave River drainage, becoming restricted to the upper Mojave River and nearby tributaries as these water systems receded. In the 1930s, arroyo chubs (*Gila orcutti*) from coastal California were introduced into the headwaters of the Mojave River and hybridized with the Mohave tui chub (Hubbs and Miller 1943). By 1970, genetically pure Mohave tui chubs had been eliminated from the Mojave River by hybridization and subsequent introgression. However, a small population of Mohave tui chub has perished in isolated ponds at Soda Springs. Mohave tui chub have subsequently been introduced into seeps and marshlands on the China Lake Naval Weapons Center and into a small pond near the town of Hinkley.

### Gila Monster

The Gila monster (*Heloderma suspectrum*) is designated a rare species by the Nevada state government (NDW 1984) and a candidate (Category 2) for Federal listing (USFWS 1982). It is a relatively uncommon large venomous lizard that occurs primarily in Arizona and northern Mexico and in portions of Nevada, California, Utah, and New Mexico (Stebbins 1966). It is diurnal in the moderate temperatures of spring and early summer, nocturnal in midsummer, and dormant in the winter. Gila monsters have an unusual and irregular color

pattern for concealment. They feed on bird and reptile eggs and small rodents. Gila monsters utilize the burrows of other animals, dig their own, or retreat to natural cavities. Gila monsters are most common on the lower slopes of desert mountains below 4,000 feet elevation, ranging into the outwash plains (Larson 1977). Preferred local habitats consist of rocky or sandy washes, canyons, and stream beds with seasonal surface water (Cross 1978).

The Gila monster is only known from two single sighting records in California: on the western slopes of the Providence Mountains and seven miles southwest of the California-Nevada border in the Clark Mountains (McGurty 1977). The latter location occurs in the study area. Suitable habitat appears to occur in the Clark Mountains such as in the lower slopes, bajadas, canyons and passes. However, surveys of suitable habitat on Clark Mountain (including the Keany Pass area) by Mitchell (1978), and the eastern Mojave Desert by McGurty (1977) failed to discover any Gila monsters. Hence, the occurrence of Gila monsters in the Clark Mountains in the study area is expected to be extremely rare. McGurty (1977) has suggested that Gila monsters in California may represent either remnant relictual populations, recent invaders, or released captives.

In southern Nevada, Gila monsters are more common, particularly along the Colorado River and in the Las Vegas, Mojave and Virgin river valleys (Bradley and Deacon 1965). Although there are no published records of Gila monsters in the Nevada portions of the study area, suitable habitat occurs in the washes of the McCullough Mountains and surrounding smaller ranges (Burr 1981; Price 1984).

Desert Tortoise

The desert tortoise (Gopherus agassizii) is designated a rare species by the Nevada state government (NDW 1984), a candidate (Category 2) for Federal listing (USFWS 1982), a California BLM sensitive species (BLM 1980), and has been considered for listing as a state rare species in the last several years (Brode 1984). The CDFG Code (Section 5000) prohibits the taking or sale of the desert tortoise in California.

The desert tortoise occurs in the deserts of California, southern Nevada, southwestern Utah, western Arizona, and northern Mexico. The greatest abundance of desert tortoise is in the Mojave Desert of California (Lukenbach 1982). It now occupies a smaller range than previously and population densities apparently have been reduced within its current range due to habitat loss, human activities, and illegal collecting.

The desert tortoise is primarily active during the early spring and fall, less active in the summer, and dormant in the winter. In March or April, tortoise emerge from burrows and are active most of the day. During the summer, tortoise have a bimodal activity pattern to escape the hottest time of day or they may remain dormant in their burrows to reduce heat stress and water

loss. Peak activity occurs in the spring when temperatures are mild and food is abundant. In the fall, males may be active, particularly with courtship and mating behavior. From October to February, tortoises are dormant in their burrows. Peak breeding activity occurs in the spring (March to June). Egg laying occurs in spring and summer; hatchlings emerge in the fall but leave burrows very infrequently.

The desert tortoise is herbivorous and feeds primarily on the foliage and flowers of spring annuals. Common plant genera include locoweeds (Astragalus spp.), Gilas (Gilia spp.), blazing stars (Mentzelia spp.), desert dandelions (Malacothrix spp.), and phacelias (Phacelia spp.). In the dry springs and during the summer, desert tortoise rely more on perennial grasses and dried herbs. Infrequent summer rains provide a second blossom of annual herbs for the fall activity period. Tortoises subsist on their stored fat when foods are not available as well as during their summer aestivation and winter dormancy periods.

Burrows are important to desert tortoises because most of their time is spent underground to regulate heat and water loss, and to escape predation. The depth and type of burrow used varies depending on seasonal temperatures and soil type. In the Mojave Desert of California and southern Nevada, the deep permanent burrows used for periods of dormancy are 1 to 3 meters deep at an angle of 10 to 30°. During the spring and summer, as well as in the fall activity period, tortoise use shallower burrows situated on flats, interwash areas, and often under shrubs. Desert tortoise utilize several different shallow burrows during the summer. They may also seek cover in a small depression (pallet) under a shrub.

The home range of the desert tortoise varies according to the geographic location, food supply, and population density. It varies in size from 10 to 100 acres in Utah to 96 to 190 acres in the western Mojave Desert of California (Woodbury and Hardy 1948; Berry 1974). In southern Nevada, Burge (1977) found the mean home range size of males and females to be 48 to 49 and 28 to 67 acres, respectively. Activities of hatchlings and juveniles are restricted closely to the burrows.

Desert tortoise occur in three vegetation types in the Mojave Desert of California and Nevada, including creosote bush scrub, Joshua tree woodland and, to a lesser extent, saltbush scrub. Desert tortoise are usually excluded from dry lake beds and unvegetated alkaline basins. Although no single soil type is preferred, it must be friable enough for digging yet firm enough to support the burrow. Soil types in desert tortoise habitat of western Mojave Desert range from gravelly flats in Stoddard Valley to sandy soils in Fremont Valley and windblown sands near Hinkley (Lukenbach 1982). Desert tortoise are generally uncommon above 3,500 feet elevation and in rocky areas, such as on upper bajadas and rugged mountain slopes.

Data on the distribution and estimated densities of desert tortoise in the study area were primarily gathered from California and Nevada BLM maps and files and a review by Lukenbach (1982) of the desert tortoise in California. In

general, desert tortoise are distributed in suitable habitat throughout most of the study area. Populations are scattered and vary in size and number based on local habitat conditions. Relatively high densities (100 to 250 or more individuals per square mile) of tortoise occur in the western portion of the study area, particularly in and near Stoddard Valley, along Highway 395, west and north of Harper Dry Lake, and west of the Calico Mountains. These areas represent some of the most important remaining desert tortoise habitat in California (BLM 1980).

Desert tortoise abundance is lower in the central and eastern portion of the study area due, in part, to greater elevations and topographic features. Areas of moderate density (40 to 155 individuals per square mile) occur in the alluvial plains north and south of Baker, in the Shadow Valley, surrounding Ivanpah Dry Lake, and in the northern Ivanpah Valley of Nevada. Relatively high density (more than 155 individuals per square mile) populations occur directly south of Baker and in the southern Ivanpah Valley. The latter area also represents one of the most important desert tortoise habitats in the eastern Mojave Desert (Lukenbach 1982).

Swainson's Hawk

The Swainson's hawk (Buteo swainsoni) is designated a rare species by the California state government (CDFG 1983), a protected species by the Nevada state government (NDW 1984), and a candidate (Category 2) for Federal listing (USFWS 1982). This species formerly occurred throughout most of California and Nevada, excluding the high mountain ranges. However, since the 1940s, there has been a severe decline in its population in both states. It is a summer resident breeder that generally nests in large trees in open plains, grasslands, and flat terrain. Cottonwood, sycamore, or willow trees are the most frequently used nesting sites. Currently, Swainson's hawk breeds in the high desert regions of northeastern California and northern Nevada, sparingly in the Central Valley, and south in the coastal woodlands from Marin County to Santa Barbara County (Bloom 1979).

Swainson's hawk is a scarce breeder in the Mojave Desert due to the lack of well developed habitat (Grinnell and Miller 1944). Nests of Swainson's hawk in the desert are generally restricted to Joshua trees and/or riparian woodlands dominated by cottonwoods. Historical nesting records in the study area occur near Adelanto and Victorville. The most recent nesting records near the study area were in 1978 at Cima Dome and Lanfair Valley (Bloom 1979). Suitable habitat appears to occur in the study area along the Mojave River Valley from Victorville to Helendale where large willows and cottonwoods occur, and in areas of Joshua tree woodland near Adelanto, Shadow Valley, Clark Mountains, and Beer Bottle Pass. However, the occurrence of nesting Swainson's hawks in the study area is expected to be rare to infrequent. Migrating Swainson's hawks are likely to occur for brief periods of time throughout much of the study area each year.

California Yellow-billed Cuckoo

The California yellow-billed cuckoo (Coccyzus americanus occidentalis) is designated a rare species by the California state government (CDFG 1980) and a candidate (Category 2) for Federal listing (USFWS 1982). It is a summer resident breeder in California that historically nested along rivers and streams in the coastal valleys from Mexico to San Francisco, in the Central Valley, along the Colorado River, and at small isolated locations elsewhere. Based on a comprehensive statewide survey conducted by Gaines (1977) and Gaines and Laymon (1984), the nesting range of the yellow-billed cuckoo has been reduced, due to the loss of riparian habitat throughout California, to Sacramento Valley, Santa Maria River, Owens Valley, Amargosa River, and the Colorado River. Yellow-billed cuckoos nest in dense riparian thickets dominated by willows and other woody riparian species such as cottonwoods. Other habitat features include dense understory, high humidity, surface water, at least 120 meters of riparian foraging habitat, with at least 10 hectares of continuous vegetation for nesting.

Yellow-billed cuckoos have never been numerous in the Mojave Desert (with the exception of the Colorado River populations) due to the lack of suitable habitat. Only two sightings have occurred in the study area: at Yermo in 1910 and in the upper Mojave River Narrows in 1978 (Mulder 1978; Gaines and Laymon 1984). Neither sighting was of a confirmed nesting individual. There appears to be only two suitable habitat areas in the study area. The upper and lower Mojave River Narrows near Victorville contain extensive willow and cottonwood woodlands and may support occasional nesting birds, although no birds have ever been recorded at this location (Mulder 1984). Riparian habitat north of Victorville is of poor quality due to the smaller and scattered stands of willows and lack of standing water. Afton Canyon may also provide suitable habitat for infrequent breeding yellow-billed cuckoos, although no birds have ever been recorded at this location (Gaines and Laymon 1984).

Migrants and transients may occur along the Mojave River in riparian thickets of dense willow, mesquite, and/or cottonwood from near Victorville to Soda Springs. However, their occurrence would be rare and highly transient.

Least Bell's Vireo

The least bell's vireo (Vireo bellii pusillus) is designated an endangered species by the California state government (CDFG 1980) and a candidate (Category 1) for Federal listing (USFWS 1982). It is a summer resident breeder in California from March to August that nests in riparian habitats. Historically, this species was very common in the Central Valley, the interior valleys of the central and southern coast, and in desert oasis and riparian woodlands of the Owen Valley, Death Valley, and Mojave River Valley (Goldwasser 1978; Goldwasser et al. 1980). Least bell's vireo nest in low dense riparian thickets, usually dominated by willows with a well developed understory.

The least bell's vireo is probably extirpated as a breeding species in the Central Valley, Owens Valley, and coastal valleys north of Santa Barbara County although some suitable habitat remains unused in these areas. Major reasons for the statewide decline in distribution and abundance include loss of riparian habitat, predation, and nest parasitism by the brown-headed cowbird. Recent statewide surveys by Goldwasser (1978) and Goldwasser et al. (1980) indicate that least bell's vireos are not known to nest in the study area, nor have there been any sightings in the study area since at least 1970. The nearest recent records are of nesting populations in Little Morongo Canyon and Big Morongo Wildlife Reserve in southeastern San Bernardino County (Goldwasser 1978). Hence, it is unlikely that least bell's vireo now nest in the study area, although the study area is within its historic range and contains suitable habitat. Occurrence of the least bell's vireo in the study area would be expected to be very rare and of migrant individuals only.

Mohave Ground Squirrel

The Mohave ground squirrel (Spermophilus mojavensis) is designated a rare species by the California state government (CDFG 1980). It has no Federal status. This species occurs only on a restricted portion of the Mojave Desert, from Olancha in Inyo County south to Victorville, and from the Tehachapi Mountains in Kern County east to the Granite Mountains in San Bernardino County (Hall and Kelson 1959; Wessman 1977). A recent survey by Wessman (1977) indicated that the Mohave ground squirrel occurs 40 miles east of the former known eastern margin of its range in the vicinity of Fort Irwin and the Avawatz Mountains. Although this range extension added about 1,800 square miles to the known Mohave ground squirrel habitat, Wessman (1977) found evidence to suggest the loss and/or displacement of this species in the Lucerne Valley.

The Mohave ground squirrel occurs on a wide variety of habitat types and has been trapped in saltbush scrub, creosote bush scrub, shadscale scrub, sandy creosote bush scrub, and Joshua tree woodland. Within its known range, this species is widespread, but relatively uncommon. It is only absent from rocky, steep slopes and dry lake playas. Areas of high concentration appear to occur in portions of Inyo County and in the Superior Valley/Lane Mountain area of San Bernardino County (BLM 1979). Mohave ground squirrel habitat mostly occurs between 1,500 and 5,000 feet (Wessman 1977).

The Mohave ground squirrel shares much of its range with the white-tailed antelope squirrel (Ammospermophilus leucurus), and Beechy ground squirrel (Spermophilus beecheyi) near agricultural and urbanized areas. The Mohave ground squirrel is closely related to the round-tailed ground squirrel (Spermophilus tereticaudus) which occurs in low elevation habitats with fine windblown sand. The entire eastern margins of the Mohave ground squirrel range is bordered by the range of the round-tailed ground squirrel. Wessman (1977) found overlap in the range of these two species at the Tiefort Mountains, Coyote Cry Lake, and Helendale. Hybridization may have occurred in the Helendale area.

The Mohave ground squirrel is diurnal and active from March through July (Bartholemew and Hudson 1961; Zembel and Gall 1980). During the rest of the year it remains in underground burrows in a state of torpor. The Mohave ground squirrel eats on a variety of green vegetation.

The Mohave ground squirrel occurs in the western portion of the study area, west of the Mojave River from Victorville to Helendale, then north and east to Lane Mountain and the Tiefort Mountains. North of Helendale, the Mohave ground squirrel does not live on, or cross, the Mojave River and its broad wash areas (Wessman 1977). It also appears that it is no longer found east of the river between Victorville and Helendale in its historic range (BLM 1980). In the westernmost portions of the study area, it is expected to be widespread but infrequently encountered in all but the most rocky, upland habitats.

## Species of Special Interest

Species of special interest include plants and animals that are of concern to agency personnel, conservationists and biologists because they: (1) appear to be of limited distribution; (2) are experiencing population declines; (3) are vulnerable to potential threats to their existence, or (4) are of unusual scientific, educational or recreational value. These species usually do not have the same rarity or vulnerability as legally protected species; hence, many do not have the same legal protection afforded rare, endangered or threatened species. However, most are protected under various Federal or state regulations. In addition, it is possible that if present trends continue or worsen, many of these species may be added to official Federal and state rare species in the future.

There are two general categories of special interest species: (1) species that are candidates for official Federal listing as threatened or endangered (USFWS 1980, 1982, 1983); and (2) species designated as sensitive species by BLM. Many species which have Federal candidacy status also have been identified as species of special interest by private conservation groups such as the Audubon Society, CNPS (Smith and York 1984) and NNPS (Mozingo and Williams 1980; NNPS 1984).

Federal candidate species are assigned to one of two categories depending on the current state of knowledge of the species and its biological appropriateness for listing (USFWS 1980, 1983). Category 1 represents species for which sufficient information is available to support the biological appropriateness for official listing as threatened or endangered. Category 2 includes species for which sufficient information is available to indicate possible listing, but for which additional data are required on vulnerability and threats. Species in these categories are usually given protection by BLM under the Endangered Species Act, pending the resolution of their official status (BLM 1980b).

BLM in California has developed sensitive species lists for plants and animals (BLM 1980b, 1984). These species are all Federal candidate species (Categories 1 and 2) and are managed accordingly. Nevada BLM has not developed a

sensitive species list but utilizes, at a minimum, the species on the Federal candidate list (Categories 1 and 2) (Driver 1984; Price 1984).

Several private conservation organizations have developed unofficial lists of special interest species. These categories are briefly described below.

**Plants**

Plants of special interest in the study area are defined to include (1) Federal candidate species, Categories 1 and 2; and (2) California BLM sensitive species. The Federal candidate list for plants was initially published in 1980 (USFWS 1980). In 1983, a revised list was published based on new information on the rarity and vulnerability of the 1980 candidate species (USFWS 1983). As a result, many species were placed in new categories, including a large number that were removed from candidate status (i.e., placed in Category 3C).

California BLM has developed a list of sensitive species (BLM 1984) that are afforded special protection and management on BLM lands. These species are all Category 1 or 2 Federal candidate species; however, some Federal candidate species which occur on BLM land have not been added to the sensitive species list. Both BLM sensitive species and Federal candidate species are given protection under the Endangered Species Act with regard to actions that may adversely affect these species (BLM 1980b). Plants on the California BLM sensitive species list, as well as Category 1 and 2 Federal candidates in California, were reviewed for their potential occurrence in the study area.

The CNPS has produced several rare plant inventories since 1974. This organization of private botanists and conservationists has developed an extensive data base on rare plants in California in cooperation with state agencies. The 1980 inventory (Smith et al. 1980) was the first comprehensive report; two addendums were issued since 1980 (Smith et al. 1981, 1982). In 1984, a new CNPS inventory (Smith and York 1984) was prepared with new categories (lists). Many species were moved to different lists based on new information on their distribution and vulnerability. The 1980 Lists 1 and 2 are now designated List 1A (presumed extinct) and List 1B (rare or rare and endangered) in the 1984 inventory. The CNPS status of Federal candidates and/or BLM sensitive species in the study area were reviewed for this project.

Nevada BLM has not developed a sensitive species list; however, it recognizes all Category 1 and 2 Federal candidate species as species requiring protection and special management (Driver 1984). In addition, Nevada BLM may use the recommendations of the NNPS concerning the priority given to candidate species on BLM lands.

NNPS is a private conservation organization similar to CNPS. A comprehensive inventory of species of special interest in Nevada was produced by NNPS in 1980 (Mozingo and Williams 1980). This inventory is updated each year at NNPS workshops attended by private botanists and agency personnel.

The 1984 lists of special interest species (NNPS 1984) include three categories in decreasing order of importance: (1) sensitive species, (2) watch list, and (3) other rare species. Sensitive species include Federally listed plants, many Category 1 and 2 candidate plants, and any other species that have similar rarity or vulnerability as determined by NNPS. The watch list contains some candidate species as well as many ex-candidate species; these species are not considered to face immediate or serious threats. The other rare list contains remaining ex-candidate species. The NNPS status of Federal candidate species in the study area was reviewed for this project.

A preliminary list of special interest plants that may occur in the central portions of Mojave Desert of California and southern Nevada was developed by a review of several regional floras (Munz 1984; Beatley 1976; Thorne et al. 1981; DeDecker 1984). This list was refined to include only species that could potentially occur in the study area, either within or adjacent to the proposed corridors, using California BLM data in the CDCA Plan (BLM 1980b) and supporting in-house data (BLM 1984; Albiston 1984), Nevada BLM data (Fisher 1980; Driver 1984), data from the CNDDB and CNPS (CNDDB 1984), data from NNPS (Mozingo and Williams 1980; Pinzl 1984), and previous botanical investigations along the I-15 and IPP transmission line corridors (BLM 1979; Woodward-Clyde 1979; BLM 1980a; Jones & Stokes 1980; Schultz 1982, 1984).

Based on these investigations, it was established that 10 species of special interest are known to occur in the study area and could occur near or within alternative corridors. The regional distribution and occurrence of these species in the study area are summarized on Table 4-5 and briefly described below.

Species that were deleted from the preliminary list of potential special-interest species are presented in Table A-1 in Appendix A. These species were not considered further in the site-specific analyses for this project for one or more of the following reasons: (1) they have been recently (1983) removed from the Federal candidate list (assigned to Category 3C); (2) they are not known to occur in the study area; and/or (3) they may occur in the study area but are not expected to occur within or adjacent to the alternative corridors.

Astragalus jaegerinus (Jaeger milkvetch)

This species is a perennial herb restricted to a 10-square-mile area on, or partially on, Coolgardie Mesa between Barstow and Goldstone in the south-central portion of the study area. It occurs in creosote bush scrub and is commonly associated with Joshua trees. This species is found on dry stony hillsides and desert mesas in granite sand and gravel at elevations of 300 to 3,000 feet.

Chorizanthe spinosa (Mojave spineflower)

This species is an annual herb that occurs in scattered but widespread areas of the western Mojave Desert in Kern and San Bernardino counties. It is found on sandy washes and flats of creosote bush scrub and Joshua tree woodland at elevations of 2,500 to 3,500 feet. Like most desert winter annuals, it does not appear conspicuously each year. Potential habitat for these species occurs throughout the western end of the study area where populations have been found near Kramer Junction, Harper Dry Lake, and Adelanto.

Coryphantha vivipara var. alversonii (Foxtail cactus)

This cactus species occurs over a wide area of the Colorado Desert and western and southern Mojave Desert, ranging from the Little San Bernardino Mountains to the Chuckwalla Mountains. It occurs on steep stony slopes of creosote bush scrub and Joshua tree woodland at elevations of 2,000 to 5,000 feet. It is expected to be very rare in the study area. The only known record of this species in the study area is at Clark Mountain Station.

Cymopterus deserticola (Desert cymopterus)

This species is a perennial herb that appears to occur very infrequently in the western Mojave Desert near Victorville, Edwards Air Force Base, and Kramer Junction. It occurs as small isolated populations on loose sandy soil of flats in old dune areas. It is found in creosote bush scrub or Joshua tree woodland at elevations of 2,300 to 4,300 feet. Only two populations have been recorded in the study area: near Kramer Junction and in Apple Valley. Other small, localized populations could potentially occur in the western portions of the study area.

Eriophyllum mohavensis (Barstow woolly sunflower)

This species is only known from four locations, all of which occur in the study area: (1) Iverson Ranch near Barstow, (2) adjacent to Mojave River across from the railroad station in Barstow, (3) scattered populations five to eight miles northeast of Kramer Junction, and (4) an unconfirmed location midway between Barstow and Kramer Junction. It is a small woolly annual herb that occurs in fine sandy or gravelly areas of varying slope at 2,000 to 3,000 feet elevation. The populations northeast of Kramer Junction are the largest known to date. A one-half section of land containing this species in this area has been declared an Area of Critical Environmental Concern (ACEC) by BLM. It is possible that additional small isolated populations could occur in the western portion of the study area.

Penstemon bicolor ssp. bicolor and roseus (Bicolored penstemon)

These subspecies are tall perennial herbs that have different flower colors. Both are restricted to mountain ranges in southern Nevada and co-occur throughout much of their respective ranges. Subspecies bicolor is only known from the east slope of the Spring Mountains in the eastern portion of the study area. It occurs in creosote bush scrub or washes, roadsides, disturbed sites, and limestone bedrock exposures at elevations of 2,000 to 5,000 feet. Subspecies roseus is more widely distributed in the Eldorado, McCullough, and Arrow Canyon mountains in similar habitats and elevations.

Phacelia anelsonii (Nelson's phacelia)

This annual species is widely distributed throughout portions of California (northeastern Mojave), Nevada (southern areas), and Utah. It is commonly found in disturbed and rocky soils between 4,000 and 5,500 feet with blackbush scrub and creosote bush scrub. It is also found in washes, on scree slopes, and talus areas. Populations are usually very small and very rare. It is known to occur in at least one site in the McCullough Mountains, and may occur in the Clark Mountains.

Puccinellia parishii (Parish's alkali grass)

This annual grass is very rare in California, being restricted to alkali seeps. It was originally collected in the Lucerne Valley. A recent collection of this species, or species closely resembling it, was made near Kramer Junction. Its occurrence in the study area is likely to be extremely rare, in highly localized sitès, and only in the western portions of the study area.

Sclerocactus polyancistrus (Mojave fishhook cactus)

This short globular-shaped cactus is widely distributed from California to Nevada (Nye County only) and Arizona. In California, it occurs in small, isolated populations with widely scattered individuals from Red Rock Canyon to Inyo County. It occurs from 2,500 to 6,500 feet elevation. It is often collected illegally. There are several known populations of this species in the western portion of the study area.

Sphaeraleca rusbyi ssp. erimicola (Rusby's desert mallow)

This is a very rare perennial herb that mostly occurs in the Panamint Mountains of Inyo County in creosote bush scrub and blackbush scrub at elevations of 3,000 to 4,500 feet. It also has been recorded in at least one location in the Clark Mountains in the study area.

## Wildlife

Wildlife species of special interest in the study area are defined as species which are not officially listed as rare, threatened or endangered, but have one or more of the following designations: (1) Federal candidate species, Categories 1 and 2 (USFWS 1982); (2) California BLM sensitive species (BLM 1980); and/or (3) protected species according to the administrative codes of the CDFG (1984), or NDW (1984).

Of the following three special interest species, only one is a Federal candidate species (ferruginous hawk), and only one is a BLM sensitive species (desert bighorn sheep).

### Golden Eagle

The golden eagle (Aquila chrysaetos) is a fully protected bird according to the CDFG (Section 3511) and NDW (1984) codes which prohibit the hunting and harassment of this species. Golden eagles are also on the third priority list developed by Remsen (1978) for CDFG, describing bird species of special concern in California. This list includes species without legal status that appear to be suffering population declines and habitat loss, or are particularly vulnerable to known or future threats. Species on the third priority list are not in any present danger of extirpation and their populations, including those of the golden eagle, are not declining; however, by virtue of their small populations in California, they are potentially vulnerable to future threats (Remsen 1978).

The golden eagle is a resident of the mountainous regions of the western United States. In the Mojave Desert of California and southern Nevada, it is a relatively uncommon resident inhabiting numerous isolated mountain ranges with suitable nesting habitat. The rocky terrain of these desert mountains provides appropriate nesting substrates on cliffs overlooking broad desert valleys and plains. In a survey of nesting sites in California, Thelander (1974) located 25 pairs of nesting eagles in the Mojave and Colorado deserts. Although golden eagles nest throughout California and Nevada, they are mostly located in undeveloped, remote mountainous areas.

Golden eagles are most commonly observed in broad open habitats where their dominant prey item, rabbits, are readily found. They hunt over a broad elevation range in many vegetation types, with the exception of dense forests and scrub vegetation. Home range size varies from 20 to 50 square miles. Nests are usually located on remote, steep cliffs overlooking open foraging habitat. Nests may occasionally be established in large transmission line towers and trees. Nesting sites are generally isolated from human activities and disturbances. Although breeding territories are established, nest sites may be located within several miles of one another. Golden eagles often must compete with other raptors such as prairie falcons and American kestrels for nesting sites. Nests are built and eggs laid in February and March. The incubation period is 5-6 weeks, followed by a nestling period of 8 to 10 weeks.

Golden eagle nesting sites have been recorded in the following mountain ranges of the study area based on data from BLM (1984) - Fairview and Sidewinder Mountains, Granite Mountains, Ord Mountains, Stoddard Ridge, Newberry Mountains, Calico Mountains, Clark Mountain Range, and McCullough Mountains. In addition, suitable nesting habitat appears to be available in many of the other isolated mountain ranges of the study area. It is likely that at least several golden eagle pairs nest in the mountains of the study area. These residents, as well as occasional migrants from the north, are likely to forage throughout all but the developed portions of the study area.

Ferruginous Hawk and Other Raptors

The ferruginous hawk (Buleo regalis) is a Category 2 candidate for Federal listing (USFWS 1982), a protected bird in Nevada (NDW 1984), and is on the Audubon Society's 1982 Blue List (Tate and Tate 1982). The latter list includes bird species whose populations throughout the nation appear to be declining or are of sufficiently small numbers to warrant concern and increased observations.

Ferruginous hawks breed in central Canada, south to eastern Oregon, Nevada, Arizona, and New Mexico. During the winter, they extend their range into California and Mexico. These raptors occur in open, semi-arid plains and nest in a variety of situations including low hillsides, small cliffs, trees along creeks, and on transmission line towers. Ferruginous hawks begin nesting in March and April, and move to southern wintering areas in September. They are fairly common winter visitors in certain inland valleys of southern California, including Owens Valley (Inyo County), Carrizo Plains (San Luis Obispo County), and the Lucerne Valley (San Bernardino County) (Garrett and Dunn 1982). The latter is adjacent to the western portion of the study area.

Ferruginous hawks are likely to be fairly common winter visitors (September to April) in the study area, foraging over open and lowland creosote bush scrub, grassy areas, and croplands (in the western portion of the study area).

There are no other raptors that reside or make seasonal use of the study area that are candidates for Federal listing (USFWS 1982) or BLM sensitive species. However, there are several raptors on the list of California bird species of special concern developed by Remsen (1978) for the CDFG that are known to occur in the study area. Although these species do not have the status afforded to candidate and/or BLM sensitive species, they are of concern to conservationists and resource agency personnel due to their rarity, vulnerability, and/or unusual scientific interest. These species include the merlin, northern harrier, Cooper's hawk, sharp-shinned hawk, and prairie falcon. Only the latter is a resident breeder in the Mojave Desert of California and Nevada. The other species are rare to uncommon winter visitors and migrants to mostly selected, localized portions of the Mojave Desert; hence, their occurrence in the study area is very seasonal, restricted in location, and rare to uncommon.

The prairie falcon (Falco mexicanus) is a resident breeder of the inland arid western United States. During the late winter and early spring breeding period, prairie falcons establish nests on cliffs and escarpments in mountainous terrain. Nesting sites are usually associated with nearby broad, open habitat for hunting. During the winter, they extend their range to agricultural areas and to the coast. Nesting habitat requirements closely resembles that described for the golden eagle. In the study area, prairie falcon nesting sites have been recorded in most major mountain ranges in the western portion of the study area based on data from the BLM (1984) including, Bell Mountain, Fairview Mountain, Stoddard Ridge, Newberry Mountains, Calico Mountains, and Cady Mountains. In addition, suitable nesting habitat appears to exist in most other mountain ranges of the study area. Prairie falcons are expected to be occasional to fairly common residents of the study area, nesting in similar habitats as the golden eagle and foraging throughout most of the study area.

Desert Bighorn Sheep

There are three races of bighorn sheep in California: Nelson's (desert) bighorn sheep (Ovis canadensis nelsoni) which is found in the desert mountain ranges; Penisular bighorn sheep (O. c. cremnobates) which is distributed along the western margin of the Colorado Desert from Palm Springs south into Mexico; and the California bighorn (O. c. californiana) which is found in the Sierra Nevada. The latter two are listed as rare by the California state government (CDFG 1980), but have no Federal status. The desert bighorn sheep is a BLM sensitive species (BLM 1980), a fully protected mammal according to the CDFG Code (Section 4700), and a regulated game animal in Nevada (NDW 1984).

In California and Nevada, desert bighorn sheep occur in more than 50 and 24 mountain ranges, respectively (Weaver 1982; McQuivey 1978). Most of the interior mountain ranges of the Mojave Desert support small populations of less than 20 sheep. The distribution and abundance of sheep have been severely reduced since the nineteenth century due to effects of human activities; as a result, many desert mountain ranges no longer support sheep populations.

Desert bighorn sheep occur in relatively inaccessible mountainous areas characterized by rocky, rugged and steep terrain (Monson and Sumner 1980). Rolling hills and gentle slopes of alluvial fans are only used briefly and infrequently. Habitat requirements include adequate food, water, escape routes, and shelter. Bighorn sheep feed on a wide variety of plants. Research in Nevada indicates that their diet consists primarily of forage grasses (65 to 75 percent), shrubs (15 to 30 percent), and herbs (5 to 10 percent) (McQuivey 1978). Important plants include needlegrass (Stipa), galleta grass, Mormon tea, winter fat (Erotia lanata), saltbush, filaree (Erodium cicutarium), and buckwheat (Eriogonum spp.).

Bighorn sheep are social animals and form different groups during the year. Most herds are groups of ewes with lambs and juveniles. During the fall

rutting period (July to November), rams join the maternal groups; at other times, rams occur singly or in small bachelor groups. Most observations of sheep consist of single individuals or groups of two to three; groups of more than 10 to 12 are unusual but occur occasionally in larger mountain ranges. Lambing occurs in February to March in special habitats which are scattered through the range and characterized by precipitous terrain, numerous escape routes, and shelter (caves). Lambing habitat is usually not readily identifiable due to its scattered occurrence, inaccessibility, and lack of dependence on water sources or food (McQuivey 1978).

Water is the most important factor limiting the distribution and abundance of bighorn sheep. Sheep acquire a small amount of water in plant food; this is an important source in the winter and may provide sufficient water such that sheep do not require free water for one to two weeks, and possibly longer periods. During the summer period, water demand is greater and sheep usually visit a permanent water source daily, but may do without water for three to five days.

Bighorn sheep occupy permanent home ranges that vary in size depending on the availability of water and food. In the winter, sheep are widely scattered and are known to travel 10 to 20 miles away from water sources. During the summer, sheep occupy a restricted area near a permament water source, rarely traveling more than one to two miles away. Sheep feed at lower elevations in the spring, moving upslope following the progression of plant growth as summer develops. Bighorn sheep are not migratory, but infrequent dispersals may occur between mountain ranges due to long-term population expansions or seasonal disposals in search of food.

The desert bighorn sheep occur in several mountain ranges of the study area. These occurrences include permanent habitat (maximum year-round area) of known populations, restricted (summer) habitat surrounding water sources, and transient habitats or movement corridors (winter habitats).

In the Nevada portion of the study area, bighorn sheep are known to occur in the following mountain ranges: South Springs, McCullough, Roach, Sheep, Highland, and Eldorado (McQuivey 1976, 1978). Permanent populations are present only in the South Springs, South McCullough, Highland, and Eldorado mountains. Within the study area, the McCullough Mountains provide the largest continuous habitat and permanent population - approximately 151 square miles and 158 sheep, respectively, in 1976 (McQuivey 1978). The South Springs and Highland ranges support significantly fewer sheep. Population surveys conducted in 1984 indicate that approximately 81 sheep reside in the McCullough Mountains. The reason for the decline in numbers is unclear (Delaney 1984).

There are 18 water sources in the McCullough Mountains south of the pass, of which only two are year-round (McQuivey 1976). There is only one seasonal water source in the northern McCullough Mountains. As a result, during the summer critical period, sheep are restricted to the southern areas near the water sources. There is past evidence of limited seasonal dispersal and

possible migration between the south McCullough Mountains and Roach and Sheep mountains; however, the latter areas do not have sufficient water and habitat features to support permanent, and possibly regular seasonal, populations. Compared to other mountain ranges in southern Nevada, the McCullough Mountains provide relatively poor sheep habitat due to limited water sources; hence, the population densities for this range are comparatively low (McQuivey 1978).

A permanent small population occurs in the Clark Mountain range near the state border. Sheep in this range apparently move freely between the Clark and South Spring mountains. These movements appear to be normal dispersal and not migrations (Weaver and Hall 1971). The population in the Clark Mountains was estimated at 40 individuals (Weaver and Hall 1971; Weaver 1982), and the population appears to be stable. A 1984 survey of the Clark Mountains showed there were 114 sheep, indicating the population has increased recently (Bickel 1984). Several permanent springs occur on Clark Mountain itself, although most are used by cattle and humans. Pachalka Spring appears to be the only one used regularly by sheep. Although there is high quality habitat between Keany Pass and Stateline, there is no permanent water source in this area.

The nearby Mescal Range and Ivanpah Mountains do not support permanent populations of sheep (Weaver et al. 1969). These mountains are only expected to be used infrequently for travel or transient feeding.

Shadow Mountain apparently supported sheep populations in the past, but none have been recorded in the past several decades (Weaver 1982). Similarly, the Ord and Rodman mountains and Alvord Mountain in the western portion of the study area represent historic habitat for desert bighorn sheep, but none have been sighted since the 1950s and 1960s. In 1984, a survey of the Newberry Mountains (BLM 1984) revealed bighorn sheep at several areas, all near Kane Spring. The discovery of sheep in these mountains suggests a possible reinvasion by sheep of previously abandoned ranges.

Permanent populations of desert bighorn sheep are present on Avawatz Mountain and the Cady Mountains. In the former location, where the population is considered stable, sheep are known to make infrequent movements to portions of the Soda Mountains for brief periods of time (Weaver and Mensch 1970). A permanent population of 25 sheep occupy the Cady Mountains, including rugged bluffs above Afton Canyon (Weaver et al. 1969). Sheep populations in the Cady Mountains appear to be declining (Weaver 1982).

## Areas of Special Biological Interest

Areas of special biological interest represent localized areas that contain biological resources that: (1) are of limited distribution; (2) are of unusual scientific or educational value; (3) represent prime examples of native biotic habitats; and/or (4) contain unusual assemblages of species. They are usually

small in area, localized, and broadly defined by topographic, hydrologic and geologic features such as basins, river channels, and mountain slopes.

Many of the following areas of special biological interest on public land in California are actively managed and/or protected by California BLM as described in the CDCA Plan (BLM 1980b). Management tools for these areas include designation of ACECs, Habitat Management Plans (HMP), and Unusual Plant Assemblages (UPA), in decreasing order of priority and protection status. ACECs are developed to protect significant areas or resources from adverse impacts of other uses. HMPs are developed to actively manage and maintain wildlife resources of areas of special interest, with limited multiple use allowed. UPAs are protected and/or managed according to the value and vulnerability of the botanical resources involved.

There are 16 areas of special biological interest in the study area. These areas are briefly described below.

**South McCullough Mountains**

This relatively narrow and elongated mountain range in the eastern portion of the study area is of special biological interest for several reasons. One, it is of sufficient elevation to support pinyon-juniper woodland on its higher slopes and ridges; this vegetation type is absent, or only occurs sparingly, on adjacent mountain ranges in the southern Nevada portion of the study area. Two, this range provides habitat for an important desert bighorn sheep population due to the presence of numerous seasonal and several permanent water sources. Third, these mountains also provide habitat for nesting raptors (golden eagles, prairie falcons, red-tailed hawks, ravens) and Gila monsters (in at least one or two desert wash areas).

**Ivanpah Valley**

Ivanpah Valley is located at the California/Nevada border. It supports relatively high densities of desert tortoise in the creosote bush scrub surrounding the dry lake. Tortoise densities of greater than 200 individuals per square mile have been recorded in the southern portion of the valley (Lukenbach 1982). Ivanpah Valley has been designated a crucial habitat for desert tortoise in the CDCA Plan (BLM 1980b). No HMP has been developed by California BLM for this area to date.

**Clark Mountain Range**

These mountains near the California-Nevada border represent an unusual biological feature in the study area for both botanical and wildlife resources. Clark Mountain reaches an elevation of 7,929 feet and supports a small relictual stand of Rocky Mountain white fir (Abies conclor var. concolor) near the crest. At lower elevations, pinyon-juniper woodland grades into Joshua

tree woodland and blackbush scrub, providing a striking example of a desert and montane vegetation gradient. Several regionally rare plant species occur at higher elevations in the range; in addition, many Great Basin plant species reach their western distribution limits on Clark Mountain at mid-elevations. There is also an unusually rich assemblage of cacti species.

A permanent population of bighorn sheep occupies the range, as well as several pairs of nesting golden eagles. Clark Mountain represents one of the two locations in California where Gila monsters have been recorded. Clark Mountain has been designated an ACEC by California BLM (BLM 1980b).

**Shadow Valley**

Shadow Valley is located west of the Clark Mountain Range and contains scattered areas of undisturbed Joshua tree woodland. It also supports relatively high densities of desert tortoise (BLM 1980b). Lukenbach (1982) estimates tortoise density of 40 to 155 individuals per square mile in the south central portion of the valley. No HMP has been developed by California BLM to date for Shadow Valley, nor has this area been proposed for ACEC designation (BLM 1980b).

**Soda Springs**

The Soda Springs area in the central portion of the study area is of special biological interest because of important botanical and wildlife resources. Along the western edge of Soda Dry Lake, there are numerous seeps and springs which have produced ponds, brackish meadows, and freshwater marshes. Hence, there are many aquatic and semi-aquatic plants present including salt grass (Distichlis spicata), rush (Juncus copperi), alkali weed (Nitrophila occidentalis), ditch grass (Ruppia cirrbosa), and bulrush (Scirpus spp.). The Federally endangered Mohave tui chub also occurs in three small ponds at Soda Springs; these ponds represent the Critical Habitat for this species and are carefully managed by the BLM and USFWS. Soda Springs has been designated an ACEC by California BLM (BLM 1980b).

**East Cronese Lake and Mojave River Wash**

East Cronese Lake is a dry lake bed in the central portion of the study area that is occasionally inundated during wet winters or due to flood diversions from the Mojave River Basin. Under such conditions, it provides seasonal habitat and/or a stopover site for migrating or overwintering waterfowl. Desert wash vegetation is well-developed south of East Cronese Lake and in the Mojave River Wash. In these areas, there are scattered hummocks dominated by desert willow (Chilopsis linearis) and honey mesquite (Prosopis glandulosa). These wash woodland/scrub areas represent some of the largest in the central Mojave Desert. No HMP has been developed to date for this area

by California BLM, nor has this area been proposed for an ACEC designation (BLM 1980b).

### Crucifixion Thorn Stand

The crucifixion thorn (Castela emoryi) is a plant species more common in the Colorado Desert of California and Mexico. Its northernmost population occurs as an isolated stand northwest of Afton Canyon. Due to the highly disjunct nature of this stand, it is of special botanical interest. This area has been designated a UPA by California BLM (BLM 1980b).

### Afton Canyon

The Mojave River surfaces in Afton Canyon during most of the year, supporting riparian woodlands dominated by willows (Salix spp.), cottonwood (Populus fremontii), mesquite (Prosopis glandulosa), tamarisk (Tamarix spp.), and scattered marsh plants such as cattails (Typha spp.). These riparian woodlands and ponds provide habitat for the regionally rare western pond turtle, a diverse and abundant avifauna, and several less common amphibians and reptiles of the Mojave Desert. In addition, bighorn sheep are known to water along portions of the river in Afton Canyon. Afton Canyon has been designated an ACEC by California BLM (BLM 1980b).

### Cady Mountains

These mountains, located in the central portion of the study area, provide habitat for a permanent population of bighorn sheep. In addition, golden eagle and prairie falcons are known to nest in these mountains (BLM 1980b). This area was originally proposed for ACEC status; no HMP has been developed to date by California BLM (BLM 1980b).

### Newberry Mountains

These mountains in the south-central portion of the study area, along with the adjacent Granite, Rodman and Ord mountains, provide nesting habitat for many raptors, particularly golden eagles and prairie falcons (BLM 1980b). Due to the abundant, continuous nesting habitat available, these mountains are of special biological interest. They were originally proposed for ACEC status; no HMP has been developed to date by California BLM (BLM 1980b).

### Harper Dry Lake

Harper Dry Lake, northeast of Kramer Junction, is seasonally inundated lake surrounded by irrigated agricultural fields. Runoff from these fields are the major surface water source. Marsh vegetation dominated by cattails (Typha

spp.) and sedges (Carex spp.) occur along the western edge of the lake. Harper Dry Lake supports a very diverse resident and seasonal avifauna, particularly of wetland bird species and migratory waterfowl. California BLM has established an ACEC at Harper Dry Lake and a HMP has recently been completed.

### Eriophyllum Mohavensis Preserve

This 32-acre parcel located northeast of Kramer Junction contains one of the largest known populations of Barstow woolly sunflower (Eriophyllum mohavensis), a BLM sensitive species and candidate (Category 2) for Federal listing. Other smaller populations of this species occur in the western portion of the study area. A HMP has been developed for this area which is also designated an ACEC.

### Sclerocactus Preserve

Two half-sections of land on the bluffs overlooking Helendale have been designated an ACEC by California BLM. This area contains a large population of Mojave fishhook cactus (Sclerocactus polyancistrus), a BLM sensitive plant species and a candidate (Category 2) for Federal listing. Other smaller populations of this species are known from nearby areas. No HMP has been developed for this area to date by California BLM.

### Western Mojave Saltbush Community

This area encompasses a significant portion of the western Mojave Desert where at least four species of Atriplex dominate (in various combinations) the low-lying alluvial plains and basins. This vegetation type has been gradually displaced by agricultural activities and grazing. Because of the widespread and often disjunct distribution of this vegetation type and due to the large portion of its occurrence on non-public land, it has not been designated an ACEC. However, it is designated a UPA by California BLM (BLM 1980b). In the study area, it occurs in scattered low-lying areas near Kramer Junction.

### Fremont/Stoddard Valleys

This area of special biological interest encompasses the broad alluvial plains from Fremont Valley (outside the study area), southeast to Stoddard Valley. This includes most of the western portion of the study area. This area supports very high densities of desert tortoise, including localized areas with greater than 200 individuals per square mile. It has been designated a crucial habitat for desert tortoise by California BLM (BLM 1980b). It was originally proposed for ACEC status; no HMP has been developed for this area.

### Mojave River

The Mojave River represents an important wetland habitat in the study area, as well as the Mojave Desert. Dense riparian woodland dominated by willows (Salix spp.), cottonwoods (Populus fremontii), and other wetland shrubs and trees occur from south of Victorville to near Helendale. Cottonwoods become less frequent along the lower reaches of the river, as it broadens into a wide sandy desert wash with dune areas and scattered desert wash woodlands dominated by mesquite (Prosopis glandulosa) and cat claw (Acacia greggii). The riparian woodlands and areas of surface water (Victorville to Helendale and at Afton Canyon) provide habitat for a diverse avifauna and various amphibians and fish, respectively.

### Wetlands

Pursuant to Executive Order 11990 (Protection of Wetlands, May 24, 1977), wetland resources in the study area have been identified and include the following habitats:

- Desert wash (scrub and woodland) - along various seasonal streams and broad drainages throughout the study area.
- Riparian woodland - along the perennially flowing portions of the Mojave River.
- Lakes - perennial and seasonally inundated (dry lakes) bodies of water throughout the study area.

These habitats, to various degrees, support wetland vegetation and a comparatively abundant and varied fauna (particularly with regard to migrant birds and/or waterfowl). These wetland habitats are described in the previous sections of this report.

## BIOLOGICAL RESOURCES WITHIN AND ADJACENT TO THE ALTERNATIVE CORRIDORS

The biological resources within one mile of the centerline of each alternative corridor (link) are described in the following sections. In addition, important biological resources adjacent to these corridors are also described. This information was developed based on an extensive literature review, contacts with knowledgeable persons, and field reconnaissance surveys.

The locations of important biological features, field observations, and major transitions between vegetation/habitat types were carefully noted, described and mapped for each corridor. In order to summarize the extensive results of these detailed, site-specific analyses for over 550 miles of alternative corridors, comprehensive inventory figures and tables were developed. Important biological resources within and adjacent to the two-mile-wide study

corridors are shown in Figures 4-2 and 4-3 (Map Volume). A more detailed description of biological resources is presented in Table B-1 (Appendix B) by milepost for each link. Information from Figures 4-2 and 4-3 and Table B-1 are summarized briefly in the following sections and associated summary tables.

## Vegetation Types

Vegetation types traversed by the proposed corridors are shown on Figure 4-2 and described in detail on Table B-1. A summary and tabulation of miles of vegetation type traversed by each alternative corridor are presented in Table 4-6.

Creosote bush scrub is the dominant vegetation type traversed by the proposed corridors. This vegetation type often intergrades with saltbush scrub and Joshua tree woodland; in these transition areas, Larrea tridentata is the dominant plant species, but widely scattered Atriplex spp. or Yucca brevifolia are present due to local environmental or topographic conditions. Creosote bush scrub occurs along all alternative corridors, over a wide range of elevations (Table 4-6).

Saltbush scrub is the second most common vegetation type traversed by the alternative corridors. It primarily occurs in low-lying basins and along edges of dry lakes and the Mojave River. Saltbush scrub is absent from 19 of the alternative corridors, most of which are in mountainous areas or on alluvial fans and bajadas. The greatest continuous areas of saltbush scrub occur along Link 3 (Ivanpah Valley), 8 (Shadow Valley), 11 (Soda Springs area), 20a (Coyote Dry Lake), and 38-42 (near Kramer Junction) as shown on Figure 4-2.

Blackbush scrub traversed by the proposed corridors is restricted to the higher slopes of the Clark Mountain Range (Links 5c-8) and the western portions of Shadow Valley (Links 7-10) as shown on Figure 4-2 and summarized in Table 4-6.

Joshua tree woodland is also a highly restricted vegetation type that is traversed by several alternative corridors. Widely scattered Joshua trees occur in creosote bush scrub and blackbush scrub vegetation types throughout the mid- and upper-elevation corridors (Links 1-10) in the McCullough and Clark mountains and in Shadow Valley, although the density of trees is too low to be classified as a Joshua tree woodland. Well-developed Joshua tree woodland occurs in small, scattered patches in the western portion of the study area, including portions of Links 30, 31 and 36-39 near Kramer Junction and Adelanto.

Desert wash vegetation occurs along all alternative corridors; however, only wash scrub with dense vegetation and well-defined channels or wash woodland with Acacia greggii, Chilopsis linearis, and/or Prosopis glandulosa were identified and mapped as shown in Figure 4-2 and summarized in Table 4-6. Major desert washes are traversed by Links 1 (Eldorado Valley), 11 (Mojave

River Wash), 14 (East Cronese Lake and Mojave River Wash), 16 (East Cronese Lake), 23 (Mojave River), 24 (Mojave River), and 27 (Mojave River).

Riparian woodland is only traversed by Links 27, 32 and 33 at the upper Mojave River where Salix spp. and Populus fremontii are present in well-defined willow, mesquite, smoketree, and the introduced tamarisk. Major desert wash areas with well-developed woodland vegetation occur in the Eldorado Valley (Link 1), Mojave River Wash (Link 11), East Cronese Lake (Links 14 and 16), and along the lower Mojave River (Links 23, 24 and 27).

Riparian woodland consists of a dense thicket of shrubs and trees along a river or stream channel with significant surface flow. Dominant plants include willow and cottonwood trees. This vegetation type is present in the study area only along the upper reaches of the Mojave River (south of Victorville to near Helendale) and at Afton Canyon. The upper Mojave River is traversed by three corridors (Links 27, 32 and 33).

No Majove montane forest or pinyon-juniper woodland are traversed by the alternative corridors, although both are present at upper elevations on Clark Mountain. Pinyon-juniper woodland also occurs in the McCullough Mountains.

## Wildlife

Four wildlife habitats can be identified in the study area, based primarily on the structure and species composition of the vegetation type which provides food and shelter: (1) scrub habitat (including desert wash habitat), (2) woodland habitat, (3) riparian woodland habitat, and (4) montane forest habitat. Each habitat supports a fairly well-defined assemblage of amphibians, reptiles, birds and mammals.

Wildlife species associated with scrub habitats are expected to be most prevalent along the alternative corridors because creosote bush scrub and saltbush scrub are the most common vegetation types traversed by the corridors. The abundance and diversity of this species assemblage are expected to vary according to local conditions, including availability of food, water sources, and disturbances. With the exception of built-up areas in the Mojave River Valley area from Barstow to Victorville and in the immediate areas surrounding Baker, Soda Springs, Yermo, and Kramer Junction, a full complement of scrub habitat species is expected to occur during all or part of the year in the study area.

Desert wash habitats occur in scattered locations along many alternative corridors as shown on Table 4-6. However, the abundance and diversity of wildlife species are not expected to increase in these localized habitats unless there is a concentration of wash trees such as mesquite and catclaw.

Woodland habitat occurs primarily in the Joshua tree woodland areas in the Clark and McCullough mountains (Links 1-10), in Shadow Valley (Links 7-10), and near Kramer Junction and Adelanto (Links 30, 31 and 36-39). Wildlife

species expected to occur in this habitat type were described previously in this report.

Riparian woodland habitat is traversed by Links 27, 32 and 33 along the upper Mojave River where numerous resident, migrant, and seasonal visitor bird species are likely to occur (Figure 4-2).

Montane forest habitat is not traversed by the alternative corridors.

Due to the season of the year when field surveys were conducted (November and December), only a limited number of indirect and direct observations were made of wildlife along the alternative corridors. In general, most amphibians, reptiles and mammals reduce their activities during the early winter when temperatures are dropping and food is relatively scarce. In addition, few winter bird visitors have arrived in the Mojave Desert and most fall migrants have already passed through. Hence, the abundance and diversity of the avifauna along the corridors were relatively low during the field surveys. However, despite these limitations on observations of wildlife, direct sighting and indirect evidence of common wildlife along the alternative corridors were noted and are listed in Table B-1.

## Legally Protected Species

Legally protected species include plants or animals designated rare, threatened or endangered by the California or Nevada state governments of the Federal government, as described previously.

### Plants

No legally protected plant species are known or likely to occur within or adjacent to the alternative corridors.

### Fish and Wildlife

Several legally protected fish and wildlife species are known or could potentially occur in the study area. Their occurrence within or adjacent to the alternative corridors is briefly described below.

#### Mohave Tui Club

The alternative corridors do not directly traverse the habitat of this legally protected fish which is restricted (in the study area) to ponds at Hinkley and Soda Springs. Links 11 and 42 pass within several miles of these ponds.

## Gila Monster

The legally protected Gila monster is an uncommon resident of sandy washes in southern Nevada and an extremely rare resident (or possibly foreign introduction) from the eastern Clark Mountains. Corridors in southern Nevada pass by or within wash habitats likely to support Gila monsters. Link 0 passes within one mile of a potential Gila monster habitat; Link 1 passes through a potential Gila monster habitat in the McCullough Mountains, as well as within several miles of another potential habitat; and Link 5c traverses potential Gila monster habitat on the eastern slopes of the Clark Mountain Ranges (Figure 4-3). The actual occurrence of Gila monsters in the habitats within the alternative corridors is expected to be rare to uncommon.

## Desert Tortoise

The desert tortoise occurs throughout most lowland scrub habitats in the study area. Relatively high populations are known to occur in the Ivanpah Valley, Shadow Valley, and in the western portion of the study area.

Known and potential desert tortoise habitat traversed by the alternative corridors is shown on Figure 4-3, described in detail in Table B-1, and summarized in Table 4-7. Estimated density values have been classified into five levels as described in Table 4-7: (1) not present, (2) low to rare or possibly absent, (3) low to moderate, (4) moderate to high, and (5) very high. The length of tortoise habitat (according to density class) traversed by each alternative corridor is presented in the table.

For at least a portion of their length, most corridors traverse potential desert tortoise habitat. Areas unlikely to provide suitable tortoise habitat such as rocky areas and barren dry lakes were readily identifiable along most corridors. The remaining portions of the corridors provide at least the lowest density class habitat for tortoise (0 to 50 individuals per square mile) as shown in Table 4-7. Localized areas of low to moderate densities (50 to 150 individuals per square mile) occurred along numerous corridors throughout the study area. Areas of moderate to high densities (100 to 250 individuals per square mile) are traversed by Link 10 in the Shadow Valley, Link 20b in the central portion of the study area, and by Links 24a-25, 27-29, 30, 32, 33, 36, 37 and 39-43 in the western portion of the study area (Figure 4-3). Very high density areas (greater than 250 individuals per square mile) are only traversed by Links 24a (1.8 miles) and 27 (6.5 miles).

## Swainson's Hawk

This legally protected bird species is a summer breeder in the Mojave Desert, but nesting records have not been recorded recently in the study area. Suitable nesting habitat is potentially available along the Mojave River from Victorville to Helendale, and in areas of Joshua tree woodland near Adelanto, Shadow Valley, Clark Mountain, and Beer Bottle Pass. However, the future

occurrence of nesting Swainson's Hawks within or near any of the alternative corridors is expected to be rare; in contrast, migrating Swainson's Hawks are likely to temporarily utilize most open habitats traversed by the alternative corridors throughout the study area.

California Yellow-billed Cuckoo

Suitable nesting for this legally protected species in the study area is restricted to the dense riparian woodlands of the upper Mojave River. Although the occurrence of nesting individuals in this area is expected to be very rare, Links 32 and 33 may traverse potential habitat used by migrant yellow-billed cuckoos.

Least Bell's Vireo

This legally protected species which is restricted to riparian habitats has not been sighted in the study area since 1970. Suitable habitat appears to occur along portions of the Mojave River, including the areas crossed by Links 27, 32 and 33. However, the occurrence of the least bell's vireo in the study area would be expected to be very rare and of migrant individuals only.

Mohave Ground Squirrel

All or part of the alternative corridors in the western portion of the study area traverse the known range of the legally protected Mohave ground squirrel, as shown on Figure 4-3 and summarized on Table 4-8. No data are available on the relative density of ground squirrels in the traversed habitats.

**Species of Special Interest**

Species of special interest in the study area are defined previously in this report, where a brief description of their general distribution in the study area is provided.

**Plants**

There are 10 plants of special interest that are known to occur in the study area, as discussed previously and summarized in Table 4-5. Of these species, two are very unlikely to occur near or within the alternative corridors - Coryphantha vivipara var. alversonii and Puccinellia parishii. The other eight species are known or likely to occur within portions of the corridors based on the proximity of known populations to the corridors and/or the presence of suitable habitat within or near the corridors.

Potential habitat and locations of known populations of special interest species within and adjacent to the alternative corridors are shown on Figure 4-2. In addition, miles of potential habitat traversed by alternative corridors for each species are summarized and tabulated in Table 4-9.

Astragalus jaegerianus (Jaeger's milkvetch)

Potential habitat for this species is located along 13.5 miles of Links 20a and 20b between Lane Mountain and the Calico Mountains. The nearest known populations are two miles northwest of Link 20a as shown on Figure 4-2.

Chorizanthe spinosa (Mojave spineflower)

This species appears to be widely scattered in the northwest portion of the study area. Potential habitat for Mojave spineflower is traversed by most corridors in the western study area, as shown on Figure 4-2 and summarized in Table 4-9.

Coryphantha vivipara var alversonii (Foxtail cactus)

This species is known from only one site in the study area in the Clark Mountains. As shown on Figure 4-2, this site is one mile south of Link 8. This species is not expected to occur within or directly adjacent to the alternative corridors. Its occurrence in the study area is expected to be very rare.

Cymopterus deserticola (Desert cymopterus)

This species is known from populations near Kramer Junction and Apple Valley and is expected to be widely distributed in scattered locations in the western portion of the study area. Potential habitat occurs along numerous corridors in the western study area as shown on Figure 4-2 and summarized in Table 4-9.

Eriophyllum mohavensis (Barstow woolly sunflower)

This species is known from current populations near Kramer Junction and from a historic record near Barstow. Suitable habitat in these areas is traversed by portions of Links 21b-23, 37-39 and 41-42 as shown on Figure 4-2 and summarized in Table 4-9.

Penstemon bicolor ssp. bicolor and roseus (Bicolored perstemons)

These two subspecies are known from various populations in the mountains of southern Nevada, including the McCullough Mountains. Approximately 6.0

miles of Link 1 traverses potential habitat of these species as shown on Figure 4-2.

Phacelia anelsonii (Nelson's phacelia)

In the study area, this species is only known from a single population in the McCullough Mountains. However, potential habitat is traversed at higher elevations of the McCullough and Clark mountains along portions of Links 1 and 5c-8 (Figure 4-2).

Puccinellia parishii (Parish's alkali grass)

This very rare species is restricted to small, localized alkali seeps and has not been positively confirmed in the study area. As a result, its occurrence along the alternative corridors is very unlikely.

Sclerocactus polyancistrus (Mojave fishhook cactus)

Several populations of this cactus are known in the western portion of the study area. Potential habitat for this species is traversed by several corridors as shown on Figure 4-2 and in Table 4-9.

Sphaeralcea rusbyi ssp. eremicola (Rusby's desert mallow)

This species is only known from one population near Keany Pass, Clark Mountains. Potential habitat is traversed by alternative corridors in the Clark Mountain Range, including Links 5c-8 (Figure 4-2, Table 4-9).

**Wildlife**

Wildlife species of special interest that are known or likely to occur in the study area were described previously. Potential habitat of these species that occurs within or adjacent to the alternative corridors is shown on Figure 4-3, described in detail in Table B-1, and briefly described below.

Golden Eagle

The golden eagle is a resident of the study area. Nesting pairs are expected to occur in at least several of the major mountain ranges traversed by the alternative corridors. In addition, golden eagles are expected to travel and hunt over most of the study area throughout the year.

The alternative corridors traverse and/or pass by several mountain ranges that provide known or likely nesting habitat for the golden eagle as summarized in

Table 4-10. Link 44 is within one mile of known golden eagle nesting habitat in the Calico Mountains. Links 5c, 6, 7 and 8 are no closer than two miles to the nesting sites on Clark Mountain and Link 23 is four to five miles north of known nesting sites in the Newberry Mountains (Figure 4-3). All other corridors listed in Table 4-10 are either adjacent or several miles from potential nesting habitat; no corridors directly traverse potential nesting habitats.

### Ferruginous Hawk and Other Raptors

The ferruginous hawk is likely to be a common winter visitor throughout the study area. This species does not nest in the Mojave Desert. It is likely to occur along most of the alternative corridors for brief periods of time during the winter for hunting and traveling events.

The prairie falcon is a relatively common resident breeder in the study area as described previously, utilizing similar nesting and foraging habitats as the golden eagle. Hence, the occurrence of potential prairie falcon nesting habitats along the alternative corridors follows that described previously for the golden eagle.

### Desert Bighorn Sheep

Permanent populations of the desert bighorn sheep occur in several of the mountain ranges in the study area. In addition, there are several smaller mountain ranges that provide seasonal (winter) habitat for bighorn sheep as shown on Figure 4-3.

The alternative corridors pass through or near portions of several known, permanent habitat areas, including the McCullough Mountains (Link 1), Clark Mountains (Links 5c-8), and Cave/Cady Mountains (Links 15 and 17). Several corridors pass through or near transient bighorn sheep habitat in the Sheep Mountains (Link 1), Roach Mountains (Link 2), Spring Mountains (Link 6), and Soda Mountains (Link 11), as summarized in Table 4-11. These latter habitats are expected to be utilized very infrequently by bighorn sheep during brief periods of the winter.

## Areas of Special Biological Interest

Areas of special biological interest in the study area are defined and described previously. The occurrence of alternative corridors within or adjacent to these areas is discussed below.

### South McCullough Mountains

Link 1 traverses the mid-point of the McCullough Mountains, one to two miles north of McCullough Pass. This point of crossing is several miles north of the pinyon-juniper woodland and permanent desert bighorn sheep populations in the southern range.

### Ivanpah Valley

Links 5b, 5c and 6 traverse the northern portion of Ivanpah Valley as shown on Figure 4-3. Links 5b and 5c also cross a small portion of the barren Ivanpah Dry Lake. Areas of Ivanpah Valley that support the highest population densities of desert tortoise occur several miles to the south.

### Clark Mountain Range

Links 5c and 6 traverse the two major passes on the southern and northern slopes of Clark Mountain, respectively. Both links cross areas of Joshua tree woodland, blackbush scrub, and cacti-rich creosote bush scrub; however, no pinyon-juniper woodland or montane forest vegetation is within or directly adjacent to these corridors. Both links are also along the margins of the permanent range of desert bighorn sheep on Clark Mountain and two miles away from known golden eagle nesting sites. Hence, Links 5c and 6 avoid traversing many of the important biological habitats of Clark Mountains. Both corridors are within the Clark Mountain ACEC.

Links 7 and 8 pass along the southwestern slopes of Clark Mountain near Mohawk Hill. Neither corridor traverses important biological habitats of this area of special interest.

### Shadow Valley

Links 6, 7 and 8 traverse Shadow Valley, including areas of blackbush scrub and Joshua tree woodland. Only Links 7 and 8 occur in the areas of moderate density desert tortoise habitat according to the data of Lukenbach (1982).

### Soda Springs

Links 11 and 12 traverse the northern portion of Soda Lake; however, this area is barren and devoid of any wetland plant species or habitat. Link 11 passes within one mile of the Soda Springs ACEC and two miles of the ponds containing the Mojave tui chub.

### East Cronese Lake and Mojave River Wash

Portions of Links 11, 14, 15, 16 and 17 traverse the desert wash habitat of lower East Cronese Lake and the Mojave River Wash. Only portions of Links 14 and 16 pass through well-developed, but widely distributed hummocks of mesquite (Prosopis glandulosa) and desert willow (Chilopsis linearis).

### Crucifixion Thorn Stand

Link 6 at Milepost 75 passes within two miles of the crucifixion thorn stand.

### Afton Canyon

Links 15, 17 and 18 are one to two miles north of Afton Canyon, passing through the western portions of Cave Mountain. These links do not traverse the ACEC boundaries or areas of riparian woodland; however, Links 15 and 17 are located in an area used periodically by the permanent bighorn sheep population to the south in the Cady Mountains.

### Cady Mountain

No alternative corridor traverses these mountain ranges. However, to the extent the permanent bighorn sheep population in this mountain range travels across Afton Canyon to Cave Mountain, Links 15 and 17 would occur in bighorn sheep habitat.

### Newberry Mountains

Link 23 passes within four to five miles of the Newberry Mountains, well away from potential and known raptor nesting sites.

### Harper Dry Lake

Link 41 occurs within one mile of Harper Dry Lake. Between Mileposts 0 and 0.9, this corridor traverses a dry low-lying area that is a topographic extension of Harper Dry Lake. This barren area does not support wetland plants nor does it appear to provide seasonal habitat for migrating waterfowl.

### Eriophyllum Mohavensis Preserve

Link 41 passes within one and one-half miles of this ACEC. Although this corridor is not near the protected population of Barstow woolly sunflower in the ACEC, it (as well as other nearby links) does traverse potential habitat for this species.

### Sclerocactus Preserve

Link 27 passes within one and one-half miles of this ACEC. Although this corridor is not near the population of Mojave fishhook cactus in the ACEC, it (as well as other nearby links) does traverse potential habitat for this species.

### Western Mojave Saltbush Community

Several corridors in the western portion of the study area near Kramer Junction traverse scattered, localized areas dominated by the saltbush scrub designated a UPA by BLM. These corridors include Links 36-39, 40a and 41-43.

### Fremont/Stoddard Valley

This area of special biological interest represents a broad regional area with relatively high densities of desert tortoise. It occurs in the western portion of the study area and is traversed by most of the corridors west of Barstow. Specific corridors which traverse areas of very high tortoise density include Links 24 and 27.

### Mojave River

This area of special biological interest is traversed at locations by Links 23, 24, 27, 32 and 33. Riparian woodland is present at the crossings of Links 27, 32 and 33, while desert wash scrub/woodland is present at the crossings of Links 23 and 24.

## AGENCY CONTACTS

Contacts were made with various agency personnel to gather data on biological resources of the study area and to discuss specific concerns with potential impacts of the proposed project. A summary of these contacts is presented at the end of this chapter.

## IMPACT ASSESSMENT AND MITIGATION PLANNING

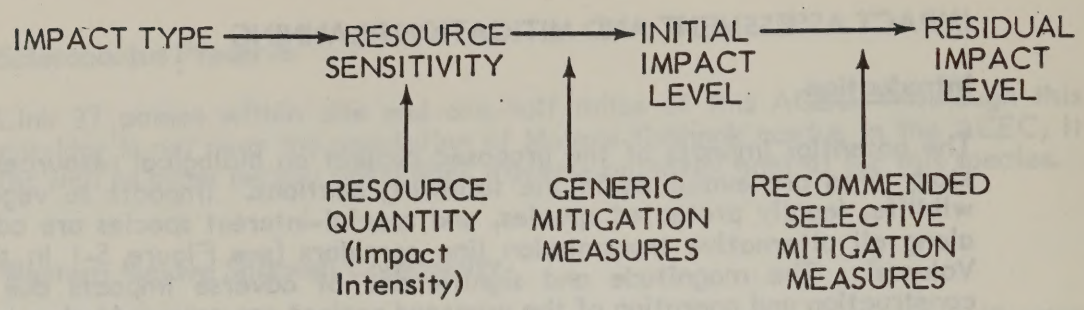
### Introduction

The potential impacts of the proposed project on biological resources of the study area are evaluated in the following sections. Impacts to vegetation, wildlife, legally protected species, and special-interest species are addressed along all alternative transmission line corridors (see Figure 5-1 in the Map Volume). The magnitude and significance of adverse impacts due to the construction and operation of the proposed project are assessed below based on the sensitivity of the affected resources, the description of the proposed project as provided by DWP, and an impact assessment model developed by Dames & Moore for this study. This qualitative model was developed in order to produce logical, consistent and repeatable impact level ratings for potential adverse effects along each alternative corridor. These impact levels, which represent composite measures of impact magnitude and significance, are converted into quantitative data for use in comparing potential impacts along alternative links during the multi-disciplinary route selection process described elsewhere. Mitigation measures incorporated into this impact assessment process include "generic" measures proposed by DWP and included in the proposed project, and "selective" measures recommended by Dames & Moore to further reduce significant impact levels.

### Impact Assessment Model

A qualitative impact assessment model was developed in order to evaluate the magnitude and significance of potential adverse impacts in a consistent, semi-quantitative manner such that impact levels along different alternative corridors can be compared to one another. This model applies only to construction impacts because they represent the only potentially significant impacts of the proposed project due to the temporary and permanent disturbance of biotic habitats associated with construction activities. In addition, only construction impacts provide a means to differentiate between impact levels of alternative links due to the varying requirements for new or upgraded access roads along each alternative corridor. As described in the following sections, impacts due to the operation and maintenance of the proposed transmission line (using any of the alternative corridors) are not expected to result in significant impacts on biological resources, nor do they differ greatly between alternative links.

The impact assessment process is comprised of seven elements as shown in the following diagram:




These elements, as well as the process by which impact levels are assessed in the model, are described in the following sections.

**Impact Types**

There are four biological impact types identified as described below:

| Impact Type | Description |
|---|---|
| 1 | Adverse effects on vegetation. |
| 2 | Adverse effects on resident and seasonal wildlife and their habitat.. |
| 3 | Adverse effects on legally protected species (animals only in this study). |
| 4 | Adverse effects on species of special interest (plants and animals). |

Each of these impact types can be further categorized into construction- and operations-associated impacts as described in the following section.

Construction Impacts

Construction impacts for the proposed project include direct and indirect adverse effects. Both categories of impacts result from the requirement for access of workers and equipment along the proposed right-of-way to construct the transmission towers and lines. The level of these impacts varies between alternative links because the need to improve or establish new access (i.e., build roads) varies from link to link. This condition, along with the conclusion that only construction activities would result in potentially significant impacts, indicate that an evaluation of construction impacts will provide the best means to evaluate impact levels along any single alternative corridor (individual significance), as well as to compare impact levels between alternative links (relative significance).

Direct Effects

Direct impacts due to construction activities consist of temporary and/or permanent disturbance, displacement, and/or removal of biological resources which include native vegetation, wildlife and their habitat, legally protected species (animals only in this study), and species of special interest (plants and animals).

Areas of Temporary Disturbance (Short-Term Impacts) - Areas of temporary disturbance include tower base construction zone (200 X 200 feet every 3.8 to 4.4 miles); wire-pulling sites (200 X 200 feet every 2 miles); wire-splicing sites (20 X 50 feet every 2 miles); construction yards (400 X 540 feet every 20 to 30 miles); and batch plant yards (one to two acres every 20 to 30 miles). These areas will be cleared of vegetation when grading and recontouring are necessary to accomplish construction activities. In other areas, vegetation will not be removed. Although vegetation in the latter areas will be crushed, revegetation will potentially occur faster than in cleared areas. All equipment will be removed following construction and, if necessary, disturbed land will be recontoured. These disturbed areas will be left to revegetate naturally and to be recolonized by wildlife as vegetation becomes established.

Temporary disturbances represent short-term impacts. The restoration of biotic habitats in the desert typically occurs at a slow rate, often requiring decades to restore vegetative biomass to pre-disturbance levels. Although temporary disturbances are considered short-term impacts, the duration of the impact on biological resources may vary from several years to several decades. However, unlike long-term impacts, these areas of temporary disturbance will eventually be restored to functioning biotic habitats.

Areas of Permanent Disturbance (Long-Term Impacts) - Permanent disturbances represent long-term impacts that would persist for the life of the project. Areas of permanent disturbance and removal include tower bases (35 X 35 feet), access roads, and spur roads. The roads will be unpaved and approximately 14 feet wide, located primarily within the 200-foot-wide right-of-way. They will be used to transport vehicles and equipment during construction and routine maintenance. The use of these roads by the public after completion of construction activities is dependent on the wishes and authority of the landowners and DWP.

There are three types of access roads for the proposed project based on the occurrence of nearby existing access roads. One, new access roads would be built where no roads currently exist. Two, existing access roads of poor quality in the proposed right-of-way would be upgraded and used wherever possible. Three, existing sufficient access roads would be used wherever possible without need for improvement.

Acreages of potential permanent disturbance and removal for both access roads and spur roads combined are calculated as follows. New access roads would require the permanent removal of about 2.0 acres per mile of transmission line. Existing roads requiring upgrading would result in the permanent

loss of 1.5 acres per mile. Sufficient existing roads would require the removal of 0.5 acre per mile for the construction of spur roads. Access requirements for each alternative link are described in the project description. Most alternative corridors have existing sufficient or to-be-upgraded roads that would be utilized.

Indirect Effects

Indirect construction impacts consist of the potential new or increased unauthorized vehicular and human activities along access roads. Such activities could result in new or increased adverse effects on the local biota due to off-road vehicle (ORV) travel; collecting of cacti; incidental damage to native vegetation or special-interest plants; and harassment, disturbance or hunting of legally protected and special-interest wildlife. The magnitude and significance of these impacts would vary depending on the need for new or improved access roads along alternative corridors.

Another indirect construction impact would consist of the potential disturbance of wildlife in adjacent habitats due to the temporary introduction of, or increase in, vehicular travel, equipment noise, and human activity. Although this impact could result in the displacement of wildlife from adjacent habitats, the magnitude and significance of this impact are low because: (1) the disturbance is temporary and localized; (2) many wildlife species may potentially acclimatize to the offsite disturbance because it would not represent a direct threat; and (3) wildlife is expected to recolonize adjacent habitats following the completion of temporary construction activities. This indirect impact would not be potentially significant and would not vary between alternative links. Hence, this impact is not considered further in the assessment model, nor are any selective mitigation measures recommended except in bighorn sheep habitat (see Impact Intensity section).

Operations

The operating transmission line would consist of stationary, unmanned, and nonmechanical structures with negligible maintenance needs. Hence, operation and maintenance of the proposed line are not expected to result in any significant impacts to biological resources for any alternative route chosen. Potential impacts associated with increased human and vehicular activities along new or improved access roads during operations are addressed previously under Construction Impacts.

Transmission line towers and access roads are not expected to present an effective obstacle to wildlife movement. However, avian collisions with conductors resulting in injury and death are likely to occur infrequently and all along the chosen route by a variety of birds, particularly migratory waterfowl. This impact is considered to be of minor magnitude and significance because: (1) the line is not located adjacent to bodies of water where larger numbers of waterfowl would be in low-altitude flights; and (2) the rate of mortality due to

collisions with conductors is expected to be extremely small compared to the number of birds in the study area due to the small size of the obstacles (i.e., conductor wire) relative to flight space. Impacts to wildlife due to electrical and magnetic fields emitted from the operating conductors are expected to be negligible as discussed in a separate report. Electrocution of raptors on transmission towers would not occur due to the great distance between conductors relative to wing spans of golden eagles and other large raptors. In fact, the proposed transmission towers provide new perch and nesting sites for raptors in the study area--a net beneficial impact.

Operation impacts described above are not included in the impact assessment model because potential impacts associated with operation of the proposed project would not result in significant impacts nor would they differ between alternative corridors.

### Resource Sensitivity

The sensitivity of the biological resources within and adjacent to the proposed alternative corridors are described below. Sensitivity is based primarily on the characteristics of the resource, including (in no particular order): (1) the legal and/or management status of the resource; (2) the apparent rarity (geographic distribution and general abundance) of the resource at both regional and state-wide levels; (3) the vulnerability and resilience of the resource to significant impacts associated with the construction of the proposed project; (4) the quantity of the resource potentially affected or its proximity to disturbance activities; and (5) the quality of the resource at that specific locale. The latter element is defined as the degree to which human disturbance such as agricultural activities or urban development has affected the resource. In this study, resource quality was not an important element in assigning resource sensitivities because most alternative links traversed habitats with only minor human disturbance.

Four levels of sensitivity are defined ranging from minimal (i.e., areas with nominal biota such as urban development) to maximum (i.e., areas of state-wide concern due to rarity and severe endangerment such as riparian woodlands). The sensitivities of the biological resources encountered along the alternative corridors are presented in Table 4-12. Note that the presence of several resources along a corridor may increase the biological sensitivity of that link beyond the individual sensitivities of the component resources.

### Resource Quantity

The resource's quantity (i.e., the amount of the biological resource potentially affected) is defined here to incorporate the areal extent of temporary and permanent physical disturbances (direct impacts) and the potential increase in human access associated with new or improved access roads (indirect impacts). As such, it is a measure of the impact intensity. Areas of temporary disturbance can be described by a constant rate along each alternative

corridor as described in the Construction Impacts section. These areas include the disturbance zone around tower bases, wire-pulling sites, wire-splicing sites, construction yards, and batch plant yards. Impacts associated with access and spur road requirements (i.e., areas of permanent disturbance) vary in intensity or quantity of the resource affected along each alternative link. In general, existing access roads will be used when the proposed right-of-way closely parallels an existing utility corridor or where other existing roads provide sufficient access. Existing narrow or poor-quality access roads will be upgraded as needed rather than build new roads. New roads will be constructed where there is no existing access. The length of spur roads will increase with improved or new access roads.

Based on the above considerations, three levels of access requirements have been identified in which the quantity of the resource affected by direct and indirect construction impacts (i.e., impact intensity) would vary as described below:

| Access Requirement | Description |
|---|---|
| Sufficient | Existing access roads are sufficient and no road building or improvement activities would occur. Intensity of impacts are due to temporary and permanent disturbances from spur roads, tower base and associated construction zone, wire-pulling and wire-splicing sites, construction yards, and batch plant yards. The major physical disturbance (i.e., road) and opportunity for unauthorized human and vehicular access already exist. Hence, this represents the lowest intensity of construction impacts and least amount of resource affected. |
| Upgraded | Existing roads would require upgrading. Other temporary and permanent disturbances would occur as described above. The intensity of impacts and quantity of resource affected are greater than above due to increased extent of permanent disturbances along the upgraded roads and the increased potential for unauthorized access on improved roads. |
| New | New access road would be constructed, resulting in new areas of permanent disturbances greater than at the lower two levels. All other areas of temporary and permanent disturbances would occur as described above. This level represents the maximum intensity of impacts and quantity of resource affected because new biotic habitats would be disturbed and new opportunities would arise for unauthorized human and vehicular activities along the right-of-way. |

Access road requirements (i.e., impact intensity) for each alternative link are described by milepost in the Results section.

## Generic Mitigation Measures

These measures represent elements of the proposed project designed to minimize and avoid, when feasible, significant impacts to biological resources along each alternative corridor. Generic mitigation measures consist of procedures, design features, and restrictions which will be implemented along all corridors. They are fully described in the separate project description. The generic mitigation measures that would apply to biological resources are listed below, including a brief description of their effectiveness in reducing impacts on biological resources.

1. All construction vehicle movement outside the right-of-way will normally be restricted to pre-designated access, contractor-acquired access, or public roads.

2. The areal extent of construction activities will normally be pre-determined with activity restricted to and confined within those limits.

These mitigation measures would require that the areas of temporary construction disturbance due to vehicle movements, tower construction, and other activities be minimized to the extent feasible by restricting the area of construction. These measures would apply to the entire lengths of all corridors and would minimize the total extent of temporary vegetation and wildlife habitat removal.

3. In construction areas where recontouring is not required, vegetation will be left in place wherever possible and the original contour will be maintained to avoid excess root damage and to allow for resprouting.

This mitigation measure would facilitate the restoration of biotic habitats by prohibiting clearing and grading in areas of temporary construction disturbance. Natural, unaided revegetation occurs more quickly in areas where vegetation is only crushed than in areas where it is removed. Hence, this measure would potentially increase the rates of revegetation and wildlife recolonization.

4. In construction areas where recontouring is required, revegetation and/or reseeding will occur as required by the landowner or BLM.

Although artificial revegetation efforts in disturbed desert vegetation have not generally proven to be successful (i.e., faster or more complete than natural, unaided revegetation), this measure could be an important procedure to restore special habitats disturbed by construction activities. It would only be applied where it is likely that revegetation procedures would be successful or necessary as required by the landowner or BLM.

### Impact Level

Impact level is a composite index of the magnitude and significance of construction impacts (direct and indirect) associated with the proposed project. It represents the end product of the impact assessment model. Impact levels are assigned by the impact assessment model shown in Table 4-13. This matrix indicates the combinations of proposed access requirements and resource sensitivity which result in different impact levels after the application of generic mitigation measures. This formal method of assigning impact levels provides a consistent and repeatable impact assessment that can be used to evaluate the significance of individual impacts, as well as to compare impact levels between alternative corridors.

There are three basic impact levels used in this study for initial impact levels as shown on Table 4-13, as well as for residual impact levels described below. These levels are: L (low), M (moderate), and H (high). In addition, there are intermediate values within this three-level framework such that a range of initial and residual impacts could occur.

Initial impact levels for each alternative corridor are presented in the Impact Assessment/Mitigation Planning (IA/MP) charts at the end of this chapter. These impact levels are assigned for all portions of each link and are delineated by mileposts. Impact levels vary along each corridor as the access requirements and/or resource sensitivity change. In addition, impact types and access levels are designated along each alternative corridor in the IA/MP charts. A brief summary of the initial impact levels is provided below.

### High Impact Level (H)

The maximum or very high impact level represents a significant impact to biological resources and occurs where there is a maximum sensitivity resource and a requirement for new access as shown on Table 4-13. The highest impacts occur at two locations along alternative corridors where very high density desert tortoise habitat (greater than 250 individuals per square mile) would be traversed.

Medium-high impact levels can occur at all levels of access requirements, depending on the sensitivity of the resource affected. These conditions occur where new access roads are required that traverse a desert wash, permanent range of bighorn sheep, or high density (100 to 250 individuals per square mile) desert tortoise habitat (IA/MP charts). High impact levels also occur along links where new roads would affect three or more moderate sensitivity resources such as habitats in the western portion of the study area that support special-interest plants, the Mohave ground squirrel, and moderate density desert tortoise populations (50 to 100 individuals per square mile). This impact level also occurs where an upgraded road would be installed through a riparian woodland.

### Moderate Impact Level

Moderate impacts are not considered significant; they occur under a wide variety of combinations of access requirements and resource sensitivities as shown on Table 4-13 and in the IA/MP charts. These impact levels occur at least once along most alternative corridors.

### Low Impact Level

Low impact levels are not significant. They are assigned only when there is an existing access road (sufficient) or an existing road that only requires minor improvements (upgraded) as shown on Table 4-13. Because most of the alternative corridors follow existing rights-of-way where there are existing roads, these impact levels are the most frequently assigned in the IA/MP charts.

### Negligible Impact Level

This impact level only occurs along corridors that traverse minimal sensitivity resources such as barren lake beds, built-up areas, and croplands. This impact level occurs infrequently and for only short lengths as shown in the IA/MP charts.

## Mitigation Planning

### Mitigation Goals

Despite the inclusion of generic mitigation measures in the project, there are many moderate to occasional high impact levels along alternative corridors as shown in the IA/MP charts. Selective mitigation measures have been developed by Dames & Moore in consultation with DWP in order to reduce initial impact levels. The goal of these recommended mitigation measures is to eliminate significant construction impacts (very high and high impact levels) and reduce certain other construction impacts (moderate and some low impact levels) to the extent that is reasonable and feasible.

### Recommended Selective Mitigation Measures

A number of selective mitigation measures were originally developed by Dames & Moore in consultation with DWP and BLM for the proposed project. Several of these apply directly to the protection of biological resources during construction activities. These can be divided into two general categories: (1) access road restrictions, and (2) avoidance measures. These recommended selective mitigation measures are described below, using the original number designations.

In addition, the application of these mitigation measures to specific resources and access requirements is noted below and summarized on Table 4-14. Selective mitigation measures are applied independently to portions of proposed corridors that have: (1) moderate to very high impact levels, or (2) low impact levels with one or more moderate sensitivity resource.

Access Road Restrictions

1. No new access will be constructed in designated areas; e.g., construction and maintenance will be accomplished without benefit of new access in designated areas. This would minimize ground disturbance, limit new or improved access ability.

This mitigation measure would prohibit the construction of new access roads in areas of high biological sensitivity such as riparian woodlands, desert washes, bighorn sheep habitat, and potential desert tortoise habitat of very high density (greater than 250 individuals per square mile). Access to construction sites would be accomplished by cross-country travel. Hence, there would be no permanent loss of vegetation or wildlife habitat. Residual impacts would consist of disturbance to vegetation by crushing and the temporary displacement of wildlife.

2. No widening or upgrading of existing access roads will be undertaken in the area (same benefits as No. 1 above).

This mitigation measure would be broadly applied to areas of low to high resource sensitivity and moderate or greater impact levels. It only applies to areas where an existing sufficient access road is present, and prohibits any temporary or permanent disturbances due to road improvement activities.

4. All access roads not required for maintenance will be permanently closed using the most effective and least environmentally damaging methods appropriate to that area with concurrence of the landowner. This would limit new or improved accessibility into the area.

This mitigation measure would discourage unauthorized vehicular access and human activity along specified access roads that traverse areas of high biological sensitivity such as riparian woodlands, desert washes, and bighorn sheep habitat. It would only apply to corridors with existing sufficient or upgraded roads. Adverse impacts associated with unauthorized access such as ORV travel and illegal cacti collecting would be reduced by this measure.

Avoidance Measures

8. In designated areas structures will be placed so as to avoid sensitive features and/or to allow conductors to clearly span the features, within limits of standard tower design. This would minimize amount of sensitive feature disturbed and/or reduce visual contrast.

This mitigation measure would be implemented primarily to avoid direct impacts from construction activities on the following maximum and major sensitivity resources: riparian woodlands and desert washes, respectively. These biological resources are usually easily delineated in the field by obvious features and can be avoided during construction activities. This measure would require the minor relocation of tower bases and the spanning of portions of natural waterways.

11. In designated areas construction activities will be modified during breeding season of sensitive, listed, or proposed threatened or endangered species. This would reduce disturbance to sensitive species.

This mitigation measure would consist of two submeasures to avoid direct impacts to desert tortoise and bighorn sheep in specified areas by conducting construction activities during certain seasons. These submeasures are described as follows:

11a. Construction activities in known desert bighorn sheep habitat would be limited to the summer and fall months when the sheep are restricted to their small, isolated crucial habitats away from potential disturbances by construction activities.

11b. Construction activities in potential desert tortoise habitat with moderate to high densities (100 to 250 individuals per square mile) or very high densities (greater than 250 individuals per square mile) would be restricted, to the extent feasible, to the period of October to March when tortoises are underground and hibernating. Hence, construction activities and vehicular movements on the ground surface would not greatly disturb the tortoise and eliminate mortality by vehicular collisions. If construction activities in these areas occur during portions of the year when tortoises are active, special surveys would be conducted to relocate tortoises from areas of potential disturbance as described in Item 13b.

13. Prior to construction, an ecological field review of tower and access road design will be conducted by an appropriately qualified professional to identify site-specific impacts to threatened, endangered, or otherwise sensitive vegetation and wildlife, and to determine the most effective means to mitigate those impacts. Possible mitigation measures could include minor adjustments in tower and road locations, closing access roads, relocating sensitive species, habitat improvements, etc.

This mitigation measure would be implemented to locate and protect special-interest plants and desert tortoise as described in the two submeasures below:

13a. The presence of special-interest plants in areas likely to provide suitable habitat would be evaluated by seasonal surveys prior to construction. Populations in potential disturbance zones would be

identified and the locations of towers, construction yards, and new access roads would be altered to avoid the populations.

13b. During construction activities in high and very high density desert tortoise habitat, a qualified biologist would be on-site to locate and collect any hibernating tortoise that would be adversely affected by construction activities. These tortoises would be relocated according to requirements of the BLM and USFWS. Similar, possibly more intensive, surveys would be conducted to identify active burrows and to relocate tortoises from areas of potential disturbance if construction activities occur when tortoises are above ground and active.

**Effectiveness of Selective Mitigation Measures**

The number and type of selective mitigation measures applied to proposed corridors are dependent on the initial impact level and resources affected. All high initial impact levels are reduced to moderate or low residual impact levels by the application of selective mitigation measures. All moderate impact levels are reduced to low or negligible residual levels, while low impact levels with moderate sensitivity resources are reduced to negligible residual levels. The effectiveness by which selective mitigation measures would reduce the initial impact levels is shown in Table 4-15.

**Results: Residual Impact Levels**

After the selective application of the recommended mitigation measures following the procedures described above, all initial impact levels have been reduced to moderate or lower residual impact levels. These results are summarized by milepost and link in the IA/MP charts.

All moderate to high initial impact levels due to the potential disturbance of special-interest plants can be mitigated by the pre-construction botanical survey (Measure 13a). All high initial impact levels associated with potential disturbance of riparian woodlands or desert washes can be mitigated by avoidance procedures and restrictions on areas of disturbance (Measures 2 and 8). Mitigation for impacts within bighorn sheep habitat (initial high impact level) include elimination of new access road (Measure 1), closure of existing access roads after construction (Measure 4), and/or a seasonal restriction on construction activities (Measure 11a). Measure 2 is recommended for many corridors in order to reduce moderate to high initial impact levels due to potential disturbance of special-interest plants, desert tortoise habitat, and Mohave ground squirrel habitat. Mitigation 13b is recommended to reduce potentially significant impacts on moderate to very high density desert tortoise habitat. In several special instances, this measure is also recommended for desert tortoise habitat of low to moderate density. In areas with the highest density desert tortoise populations, Measure 1 is also recommended to reduce the high initial impact level.

## Conclusions

Based on the above impact assessment the following conclusions are made:

1. Impacts due to operation and maintenance of the proposed project are not expected to result in any significant adverse impacts to biological resources; hence, no specific mitigation measures are recommended. A potential net beneficial impact could occur due to increased perch and nesting sites for raptors on transmission towers.

2. Construction activities represent the only potentially significant impacts to biological resources. The type and intensity of these impacts vary between alternative corridors depending primarily on the sensitivity of the affected resources and the access road requirements.

3. Construction of the proposed project would result in high initial impact levels (i.e., significant impacts) along many alternative corridors, particularly those requiring new access roads.

4. All moderate to very high initial impacts can be feasibly reduced by the application of reasonable and effective selective mitigation measures. Hence, construction of the project along any route is not expected to result in significant impacts to biological resources.

## AGENCY CONTACTS

## BIOLOGICAL RESOURCES

| Agency | Date | Type of Contact | Summary |
|---|---|---|---|
| United States Bureau of Land Management | | | |
| Barstow Resource Area, Barstow, California | | | |
| Daryl Albiston, Natural Resource Specialist | 12/5/84 | Meeting | Rare plant occurrence in study area and BLM's concerns about project impacts. |
| California Desert District, Riverside | | | |
| Larry Foreman, District Biologist | 10/2/84 to 12/4/84 | Meetings/ Telephone | BLM data on biological resources in the study area and BLM's concerns with project impacts. |
| Kristin Berry, Wildlife Biologist/Desert Tortoise Expert | 12/6/84 | Telephone | Current data on tortoise distribution in study area. |
| Las Vegas District, Las Vegas, Nevada | | | |
| Dave Pulliam, Wildlife Biologist | 11/27/84 | Telephone | Requested data and received referrals to staff members. |
| Terry Driver, Range Conservationist | 12/3/84 | Meeting | Rare plant occurrence in the study area and BLM's concerns about project impacts. |
| Stateline Resource Area, Las Vegas, Nevada | | | |
| Roy Price, Wildlife Biologist | 12/3/84 | Meeting | BLM data on bighorn sheep, raptors, desert tortoise, and Gila monsters in study area, and BLM's concerns about project impacts. |

Agency Contacts (continued)
Biological Resources

| Agency | Date | Type of Contact | Summary |
|---|---|---|---|
| United States Department of Fish and Wildlife Service | | | |
| Endangered Species Office | | | |
| Laguna Niguel, California | | | |
| Ray Bransfield, Biologist | 12/11/84 | Telephone | USFWS's concerns about project impacts. |
| Karla Kramer, Wildlife Biologist | 12/11/84 | Telephone | USFWS's data on biological resources in study area and concerns with project impacts; data request. |
| Sacramento, California | | | |
| Jim Bartel, Botanist | 11/27/84 | Telephone | USFWS's concern about rare plants in the study area. |
| Ted Rado, Wildlife Biologist | 12/13/84 | Letter | Significant biological resources in the study area. |
| Great Basin Complex, Reno | | | |
| Donald Sada | 12/7/84 | Letter | Occurrence of endangered species in study area. |
| Utah, Idaho and Nevada areas, Idaho | | | |
| Bob Parenti, Wildlife Biologist | 11/27/84 | Telephone | Inform USFWS of project and receive referred to district office. |
| California Department of Fish and Game, Region 5, Chino | | | |
| Frank Hoover, Fisheries Biologist | 12/18/84 | Letter | Provided information on desert tortoise and Gila monsters in study area. |

Agency Contacts (continued)
Biological Resources

| Agency | Date | Type of Contact | Summary |
|---|---|---|---|
| California Department of Fish and Game (continued) | | | |
| Unit 5-7, Victorville | | | |
| Bob Vernoy, Wildlife Biologist | 12/1/84 | Telephone | CDFG data on biological resources in study area and CDFG's concerns with project impacts. |
| California Natural Diversity Data Base and California Native Plant Society, Sacramento | | | |
| Rick York, Director, Rare Plants | 12/6/84 | Telephone | Status of CNPS-listed plants. |
| Nevada Department of Wildlife, Las Vegas | | | |
| Dan Delaney, Wildlife Biologist/ Bighorn Sheep Biologist | 12/3/84 | Meeting | Occurrence of bighorn sheep in study area (Nevada) and NDW's concerns about project impacts. |
| Butch Padilla, Wildlife Biologist | 12/3/84 | Meeting | NDW data on bighorn sheep, raptors, and desert tortoise in the study area, and NDW's concerns with project impacts. |
| Ross Haley, Wildlife Biologist | 12/27/84 | Telephone | Desert tortoise and raptors in the study area. |
| Nevada Division of Forestry, Carson City | | | |
| Patrick Murphy, Assistant State Forester | 11/28/84, 11/29/84 | Letter | Occurrence of state-listed plants in the study area. |

Agency Contacts (continued)
Biological Resources

| Agency | Date | Type of Contact | Summary |
|---|---|---|---|
| Nevada State Museum and Nevada Native Plant Society, Carson City<br>Ann Pinzl, Botanist | 11/28/84 | Letter | Provided data on rare plants in the study area. |
| University of California, Davis<br>Department of Wildlife and Fisheries<br>Alice Karl, Wildlife Biologist/Desert Tortoise Biologist | 12/4/84 | | Assisted in field surveys in Nevada, particularly concerning potential desert tortoise habitat. |

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# TABLES

TABLE 4-1
COMMON AND CHARACTERISTIC PLANT SPECIES IN THE STUDY AREA

| Scientific Name | Common Name | Growth Form[a] | Vegetation Type[b] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | CBS | SS | BS | JTW | PJ | DW | RW | MMF |
| Abies concolor ssp. concolor | Rocky Mountain white fir | T | | | | | | | | X |
| Acacia greggii | catclaw | S/T | | | | | | X | | |
| Acamptopappus schokleyi | goldenhead | SS | X | X | X | X | | | | |
| Agave utahensis nevadensis | Utah agave | S | | | X | | X | | | X |
| Allenrolfea occidentalis | pickleweed | PH | | | | | | X | X | |
| Amelanchier utahensis | - | S | | | | | X | | | X |
| Ambrosia dumosa | burrobush | SS | X | X | | X | | X | | |
| Argemone corymbosa | prickly poppy | PH | X | | | | | | | |
| Artemisia nova | dwarf sagebrush | S | | | X | | X | | | |
| A. tridentata | Great Basin sagebrush | S | | | X | | X | | | X |
| Astragalus spp. | locoweed | PH | X | X | X | X | X | X | | |
| Atriplex canescens | four-winged saltbrush | S | X | X | | X | | X | | |
| A. confertifolia | shadscale | S | X | X | | X | | X | | |
| A. hymenelytra | desert holly | S | X | X | | X | | X | | |
| A. polycarpa | all-scale | S | X | X | | | | X | | |
| Baccharis glutinosa | mule fat | S | | | | | | X | X | |
| B. sergiloides | waterweed | S | | | | | | X | X | |
| Bassia hyssopifolia | five hook bassia | PH | | | | | | X | X | |
| Bebbia juncea | sweet bush | SS | | | | | | X | | |

Table 4-1 (continued)
Common and Characteristic Plant Species in the Study Area

| Scientific Name | Common Name | Growth Form[a] | Vegetation Type[b] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | CBS | SS | BS | JTW | PJ | DW | RW | MMF |
| Bouteloua spp. | gramma grass | PG | X | | X | X | X | | | |
| Brickellia arguta | bricklebush | S | | | | | | X | | |
| Cassia armata | desert senna | S | X | X | | | | | | |
| Cercocarpus ledifolius | mountain mahogany | S | | | | | X | | | X |
| Chilopsis linearis | desert willow | S | | | | | | X | X | |
| Chrysothamnus nauseosus | rabbit brush | S | | | X | X | | | | X |
| Coleogyne ramosissima | blackbush | SS | | | X | X | X | | | |
| Corypthanta vivipara ssp. deserti | desert coryphantha | C | | | X | X | | | | |
| Cowania mexicana | cliffrose | S | | | X | | X | | | |
| Croton californica | desert croton | PH | X | X | X | X | | X | | |
| Dalea spinosa | smoke tree | S | | | | | | X | | |
| D. fremontii | indigo bush | S | | | X | | | | | |
| Distichlis spicata | salt grass | PG | | | | | | X | X | |
| Echinocactus polycephalus | many-headed barrel cactus | C | | | X | | | | | |
| Echinocereus engelmanii | hedgehog cactus | C | X | X | X | | | | | |
| Encelia farinosa | brittlebrush | S | X | X | | | | | | |
| Ephedra nevadensis | morman tea | S | | | X | | | | | |
| E. viridis | green ephedra | S | X | | X | | | | | |

Table A-1 (continued)

Common and Characteristic Plant Species in the Study Area

| Scientific Name | Common Name | Family | CBS | SS | BS | TLM | TS | FBS | FSA | BMS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Abundance Index | | | | | | | |
| Carex aquatilis | water sedge | C | X | | X | | | | | |
| Carex atherodes | awned sedge | C | | | X | | | | | |
| Carex pellita | woolly sedge | C | X | X | | | | | | |
| Carex praticola | meadow sedge | C | X | X | X | | | | | |
| Carex scoparia var. scoparia | blunt broom sedge | C | | | X | | | | | |
| Cirsium arvense | Canada thistle | FC | | | | | | X | X | |
| Cirsium vulgare | bull thistle | FC | | | X | | | | | |
| Cornus stolonifera | red osier dogwood | S | | | | | | X | | |
| Crataegus douglasii | black hawthorn | SH | X | X | X | X | | X | | |
| Crataegus rivularis | mayhaw | S | | | X | | X | | | |
| Cyperus fuscus | brown flatsedge | C | | | X | X | | | | |
| Dactylis glomerata | orchardgrass | G | | | X | | | | | |
| Deschampsia cespitosa | tufted hairgrass | G | | | X | X | X | | | |
| Elaeagnus angustifolia | russian olive | T | | | X | X | | | | X |
| Elymus repens | quackgrass | G | | | | | | X | X | |
| Equisetum arvense | common horsetail | F | | | | | X | | | X |
| Equisetum fluviatile | water horsetail | F | X | X | | | | | | |
| Equisetum hyemale | scouring rush | F | | | | | | X | | |
| Festuca arundinacea | tall fescue | G | X | | X | X | X | | | |

Table 4-1 (continued)
Common and Characteristic Plant Species in the Study Area

| Scientific Name | Common Name | Growth Form[a] | Vegetation Type[b] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | CBS | SS | BS | JTW | PJ | DW | RW | MMF |
| Erionueron pulchellum | fluff grass | PG | X | X | X | X | | | | |
| E. fasciculatum | buckwheat | S | X | | X | X | X | X | | |
| E. inflatum | desert trumpet | PH | X | X | | | | | | |
| Erodium cicutarium | filaree | AH | X | | | | | | | |
| Eurotia lanata | winter fat | PH | X | X | X | | | | | |
| Fallugia paradoxa | apache plume | S | | | | | X | | | X |
| Ferocactus acanthoides | barrel cactus | C | X | | X | X | | | | |
| Grayia spinosa | hopsage | S | X | | X | X | | | | |
| Gutierrezia microcephala | matchweed | SS | X | X | X | X | X | X | | |
| Haplopappus linearifolius | goldenbush | S | | | X | | X | | | |
| H. cooperi | cooper goldenbush | S | X | | X | X | | | | |
| Hilaria rigida | big galleta | PG | X | | X | X | | | | |
| Hymenoclea salsola | cheesebush | S | X | X | | X | | X | | |
| Isomeris arborea | bladder pod | S | X | X | | X | | | | |
| Juncus mexicanus | rush | S/T | | | | | | X | X | |
| Juniperus osteosperma | Utah juniper | PH | | | X | | X | | | X |
| Krameria parvifolia | little-leaved ratany | S | X | X | X | X | | | | |
| Larrea tridentata | creosote bush | S | X | X | X | X | | | | |
| Lycium andersonii | box thorn | S | X | X | X | X | X | | | |

Table 4-1 (continued)
Common and Characteristic Plant Species in the Study Area

| Scientific Name | Common Name | Growth Form[a] | Vegetation Type[b] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | CBS | SS | BS | JTW | PJ | DW | RW | MMF |
| Menodora spinescens | spiny menodora | SS | X | | X | X | X | | | |
| Muhlenbergia porteri | bush muhly | PG | X | X | X | X | | | | |
| Nicotiana trigonophylla | desert tobacco | PH | | | | | | X | | |
| Nitrophila occidentalis | alkali weed | PH | | | | | | X | | |
| Oenothera deltoides | desert primrose | PH | X | X | X | X | | | | |
| Opuntia acanthocarpa | buckhorn cholla | C | X | X | X | X | | X | | |
| O. basilaris | beavertail cactus | C | X | | | X | | | | |
| O. bigelovii | jumping cholla | C | X | | | X | | | | |
| O. echinocarpa | silver cholla | C | X | | X | X | | | | |
| O. erinacea | Mojave prickly pear | C | X | X | | X | X | | | X |
| O. ramosissima | pencil cholla | C | | | X | | | | | |
| Oryzopsis hymenoides | Indian rice grass | PG | X | X | X | X | X | X | | |
| Physalis spp. | ground cherry | PH | X | | | | | | | |
| Pinus monophylla | one-needle pinyon | T | | | | | X | | | X |
| Populus fremontii | desert cottonwood | T | | | | | | | X | |
| Prosopis glandulosa | honey mesquite | T | | | | | | X | X | |
| Prunus fremontii | desert almond | S | X | | | | X | X | | |
| Psilostrophe cooperi | paper flower | S | X | X | | X | | | | |
| Rhus trilobata | squaw bush | S | | | | | X | | | X |

Table 4-1 (continued)

Common and Characteristic Plant Species in the Study Area

| Scientific Name | Common Name | Chem. Group | Adsorption Group | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | CBS | SS | LS | WA | LT | CM | HM | WM |
| Ipomoea purpurea | morning glory | HN | | | | | | X | | |
| Nicotiana tabacum | tobacco | HN | | | | | | X | | |
| Nuphar polysepalum | pond lily | PC | X | X | X | X | | | | |
| Oenothera biennis | evening primrose | C | X | | X | | X | | | |
| Oenothera lamarckiana | evening primrose | C | X | | X | | | | | |
| Oenothera parviflora | evening primrose | C | X | | X | | | | | |
| Oenothera pallida | evening primrose | C | X | | X | | | | | |
| Oenothera perennis | evening primrose | C | X | | X | | | | | |
| Oenothera rhombipetala | evening primrose | C | X | | X | | | | | |
| Oenothera suffrutescens | evening primrose | C | X | | X | | | | | |
| Oenothera tetragona | evening primrose | C | X | X | X | X | | X | | |
| Opuntia polyacantha | prickly pear | HN | X | X | X | X | | | | |
| Opuntia rufida | prickly pear | HN | | | | | | X | | |
| Opuntia macrorhiza | prickly pear | HN | | | | | | X | | |
| Parthenocissus inserta | Virginia creeper | PC | X | X | X | X | | | | |
| Pedicularis canadensis | lousewort | HN | X | | X | X | X | | | |
| Pedicularis gladioides | lousewort | HN | X | | | | | | | |
| Phalaris arundinacea | reed canary grass | C | | | | | | | X | |
| Phalaris canariensis | canary grass | C | | | | | | | X | |
| Phalaris caroliniana | canary grass | C | | | | | | | X | |
| Phalaris intermedia | canary grass | C | | | | | | | X | |
| Phalaris lemmonii | canary grass | C | | | | | | | X | |
| Phalaris minor | canary grass | C | | | | | | | X | |
| Phalaris stenoptera | canary grass | C | | | | | | | X | |
| Phalaris tuberosa | canary grass | C | | | | | | | X | |
| Phalaris vulgata | canary grass | C | | | | | | | X | |
| Phleum pratense | timothy | C | | | | | | | X | |
| Phleum stevenianum | timothy | C | | | | | | | X | |
| Phragmites communis | reed | C | X | X | X | X | X | X | X | X |
| Physocarpus opulifolius | ninebark | C | | | | | | | X | |
| Pinus banksiana | jack pine | C | | | | | | | X | |
| Pinus resinosa | red pine | C | | | | | | | X | |
| Pinus strobus | white pine | C | | | | | | | X | |

Table 4-1 (continued)
Common and Characteristic Plant Species in the Study Area

| Scientific Name | Common Name | Growth Form[a] | Vegetation Type[b] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | CBS | SS | BS | JTW | PJ | DW | RW | MMF |
| Salazaria mexicana | bladder sage | S | X | X | | X | | X | | |
| Salix spp. | willow | T | | | | | | | X | |
| Salsola iberica | Russian thistle | PH | X | | | | | X | X | |
| Salicornia spp. | glasswort | PH | | | | | | X | | |
| Sarcobatus vermiculatus | greasewood | PH | | | | | | X | | |
| Scirpus spp. | bulrush | PH | | | | | | | X | |
| Sphaeralcea ambigua | desert globe mallow | AH | X | X | | | | | | |
| Sporobolus spp. | drop seed | PG | | | | X | X | | | |
| Suaeda spp. | seep weed | PH | | | | | | X | | |
| Tamarix spp. | tamarisk | T | | | | | | X | X | |
| Tetradymia spinosa | cottonthorn | S | X | X | X | X | | | | |
| Thamnosma montana | turpentine bush | S | X | | X | | | | | |
| Typha latifolia | cattail | PH | | | | | | | X | |
| Yucca baccata | Spanish bayonet | S | X | | X | | | | | |
| Y. brevifolia | Joshua tree | S | X | | X | X | | | | |
| Y. schidigera | Mojave yucca | S | X | | X | X | | | | |

[a]T = tree; S = shrub; SS = subshrub; PH = perennial herb; PG = perennial grass; AH = annual herb; C = cactus.

[b]CBS = creosote bush scrub; SS = saltbush scrub; BS = blackbush scrub; JTW = Joshua tree woodland; PJ = pinyon-juniper woodland; DW = desert wash and alkali basin vegetation; RW = riparian woodland; MMF = Mojave montane forest.

Table 4-1 (continued)
Common and Characteristic Plant Species in the Study Area

| Scientific Name | Common Name | Growth Form | Vegetation Type CRS | SS | DS | JTR | PJ | CW | EW | RSF |
|---|---|---|---|---|---|---|---|---|---|---|
| Salvia mexicana | blister sage | S | | X | | X | | X | | |
| Salix spp. | willow | T | | | | | | | X | |
| Salsola iberica | Russian thistle | FH | X | | | | | X | X | |
| Salsola spp. | glasswort | FH | | | | | | X | | |
| Sarcobatus vermiculatus | greasewood | FH | | | | | | X | | |
| Salicornia spp. | saltwort | FH | | | | | | | X | |
| Schoenoplectus americanus | bayou pickle rushes | RH | | X | | | | | | |
| Suaeda spp. | seep seed | FH | | | | X | X | | | |
| Suaeda spp. | seep weed | FH | | | | | | X | | |
| Tamarix spp. | tamarisk | T | | | | | | X | X | |
| Tamarix ramosissima | saltcedar | S | | X | X | X | | | | |
| Thuja plicata monticola | arborvitae bush | S | X | | | | | X | | |
| Typha latifolia | cattail | GH | | | | | | | X | |
| Yucca baccata | Banana yucca | S | X | | | X | | | | |
| Y. brevifolia | Joshua tree | S | X | | X | X | X | | | |
| Y. schidigera | Mojave yucca | S | X | | X | X | X | | | |

* T = tree; S = shrub; SS = subshrub; FH = herbaceous forbs; GH = perennial grass; AH = annual herb; C = cactus.

Key: CRS = creosote bush scrub; SS = saltbush scrub; DS = blackbrush scrub; JTR = Joshua tree woodland; PJ = pinyon-juniper woodland; CW = desert wash and other small basin vegetation; EW = riparian woodland; RSF = Mojave riparian forest.

TABLE 4-2
COMMON AND CHARACTERISTIC AMPHIBIANS AND REPTILES
OF THE STUDY AREA[a]

| Common Name | Scientific Name | Characteristic Habitat[b] SH | WH | MH | RH |
|---|---|---|---|---|---|
| Couch's spadefoot toad | Scaphiopus couchi | X | | | |
| Bullfrog | Rana catesbeiana | | | | X |
| Northern leopard frog | Rana Pipiens | | | | X |
| Great plains toad | Bufo cognatus | | | | X |
| Southwestern toad | Bufo microscaphus | | | | X |
| Red-spotted toad | Bufo puctatus | | | | X |
| Woodhouse's toad | Bufo woodhousei | | | | X |
| Pacific treefrog | Hyla regilla | | | | X |
| Desert tortoise | Scaptochyles agassizii | X | | | |
| Desert gecko | Coleonyx v. variegatus | X | | | |
| Zebra-tailed lizard | Callisaurus draconoides | X | | | |
| Desert-collared lizard | Crotaphytus insularis bicinctores | X | | | |
| Desert iguana | Dipsosaurus dorsalis | X | | | |
| Long-nosed leopard lizard | Gambelia w. wislizenii | X | | | |
| Desert-horned lizard | Phrynosoma platyrhinos | X | | | X |
| Western chuckwalla | Sauromalus o. obesus | X | | | |
| Sagebrush lizard | Sceloporus graciosus | | X | X | |
| Desert spiny lizard | Sceloporus magister | X | X | | |
| Mojave fringe-toed lizard | Uma scoparia | X | | | |
| Long-tailed brush lizard | Urosaurus graciosus | X | | | |
| Side-blotched lizard | Uta stansburiana | X | X | | X |
| Banded Gila monster | Heloderma suspectum cinctum | X | | | |
| Desert night lizard | Xantusia c. virgilis | | X | | |
| Great basin whiptail | Cnemidophorus t. tigris | X | X | | |

TABLE 3-A-2
COMMON AND CHARACTERISTIC AMPHIBIANS AND REPTILES
OF THE STUDY AREA

| Common Name | Scientific Name | Characteristic Habitat[2] | | | |
|---|---|---|---|---|---|
| | | SH | WD | MH | PH |
| Couch's spadefoot toad | Scaphiopus couchii | X | | | |
| Bullfrog | Rana catesbeiana | | | | X |
| Northern leopard frog | Rana pipiens | | | | X |
| Great plains toad | Bufo cognatus | | | | X |
| Southwestern toad | Bufo microscaphus | | | | X |
| Red-spotted toad | Bufo punctatus | | | | X |
| Woodhouse's toad | Bufo woodhousii | | | | X |
| Pacific treefrog | Hyla regilla | | | | X |
| Desert tortoise | Gopherus agassizii | X | | | |
| Desert gecko | Coleonyx variegatus | X | | | |
| Zebra-tailed lizard | Callisaurus draconoides | X | | | |
| Desert-collared lizard | Crotaphytus bicinctores | X | | | |
| Desert iguana | Dipsosaurus dorsalis | X | | | |
| Long-nosed leopard lizard | Gambelia wislizenii | X | | | |
| Desert-horned lizard | Phrynosoma platyrhinos | X | | | X |
| Western chuckwalla | Sauromalus obesus | X | | | |
| Sagebrush lizard | Sceloporus graciosus | | X | | X |
| Desert spiny lizard | Sceloporus magister | X | | | |
| Mojave fringe-toed lizard | Uma scoparia | X | | | |
| Long-tailed brush lizard | Urosaurus graciosus | X | | | |
| Side-blotched lizard | Uta stansburiana | X | | X | |
| Banded Gila monster | Heloderma suspectum cinctum | X | | | |
| Desert night lizard | Xantusia c. vigilis | X | | | |
| Great basin whiptail | Cnemidophorus t. tigris | X | | | |

Table 4-2 (continued)
Common and Characteristic Amphibians and Reptiles of the Study Area

| Common Name | Scientific Name | Characteristic Habitat[b] | | | |
|---|---|---|---|---|---|
| | | SH | WH | MH | RH |
| Western red-tailed skink | Eumeces gilberti rubricandatus | | X | X | |
| Great basin skink | Eumeces skiltonianus utahensis | | X | X | |
| Western blind snake | Leptotyphlops humilis | X | | | |
| Rosy boa | Lichanura trivirgata | | X | | X |
| Glossy snake | Arizona elegans | X | | | |
| Western shovel-nosed snake | Chionactis occipitalis | X | | | |
| Racer | Coluber constrictor | | X | X | |
| Regal ringneck snake | Diadophis punctatus regalis | | X | X | X |
| Desert night snake | Hypsiglena torquata deerticola | X | | | X |
| Common kingsnake | Lampropeltis getulus | X | | | |
| Coachwhip | Masticophis flagellum | X | | | |
| Striped whipsnake | Masticophis taeniatus | X | X | | |
| Spotted leaf-nosed snake | Phyllorhynchus decuratatus | X | | | X |
| Great Basin gopher snake | Pituophis melanoleucus deserticola | X | X | X | X |
| Long-nosed snake | Rhinocheilus lecontei | X | | | |
| Western patch-nosed snake | Salvadora hexalepis | X | | | |
| Ground snake | Sonora semiannulata | X | | | X |
| Western black-headed snake | Tantilla planiceps | X | | | X |
| Lyre snake | Trimorphodon biscutatus | X | X | X | |
| Western diamondback rattlesnake | Crotalus atrox | X | | | X |
| Sidewinder | Crotalus cerastes | X | | | |

Table 4-2 (cont'd)
Common and Characteristic Amphibians and Reptiles in the Study Area

| Common Name | Scientific Name | Characteristic Habitat[a] | | | |
|---|---|---|---|---|---|
| | | Sd | Wd | Md | Hd |
| Western red-tailed skink | [illegible] | | X | | X |
| Great basin skink | [illegible] | | X | | X |
| Western blind snake | [illegible] | X | | | |
| Rosy boa | [illegible] | | X | | X |
| Glossy snake | [illegible] | X | | | |
| Western shovel-nosed snake | [illegible] | X | | | |
| Racer | [illegible] | | X | | X |
| Regal ringneck snake | [illegible] | | X | X | X |
| Desert night snake | [illegible] | X | | | X |
| Common kingsnake | [illegible] | X | | | |
| Coachwhip | [illegible] | X | | | |
| Striped whipsnake | [illegible] | X | | X | |
| Spotted leaf-nosed snake | [illegible] | X | | | X |
| Great Basin gopher snake | [illegible] | X | X | X | X |
| Long-nosed snake | [illegible] | X | | | |
| Western patch-nosed snake | [illegible] | X | | | |
| Striped snake | [illegible] | X | | | X |
| Western black-headed snake | [illegible] | X | | | X |
| Lyre snake | [illegible] | X | X | X | |
| Western diamondback rattlesnake | [illegible] | X | | | X |
| Sidewinder | [illegible] | X | | | |

Table 4-2 (continued)
Common and Characteristic Amphibians and Reptiles of the Study Area

| Common Name | Scientific Name | Characteristic Habitat[b] | | | |
|---|---|---|---|---|---|
| | | SH | WH | MH | RH |
| Speckled rattlesnake | Crotalus mitchelli | X | X | | |
| Mojave rattlesnake | Crotalus scutellatus | X | X | | |

[a]These are common and characteristic reptiles and amphibians of the study area; this is not intended to be a comprehensive herptofaunal list.

[b]Habitat types are described in the text under Wildlife. SH = scrub habitats (creosote bush, blackbush, and saltbush scrub); WH = woodland habitats (Joshua tree and pinyon-juniper woodlands); MH = montane habitats; and RH = riparian woodland, desert wash, and wetland habitats.

TABLE 4-3
COMMON AND CHARACTERISTIC BIRDS OF THE STUDY AREA[a]

| Common Name | Characteristic Habitat[b] SH | WH | MH | RH | Seasonal Occurrence[c] | Abundance in Study Area[d] |
|---|---|---|---|---|---|---|
| Common Loon | | | | X | M | V |
| Pied-billed Grebe | | | | X | R | C |
| Eared Grebe | | | | X | M | R |
| Western Grebe | | | | X | M | R |
| American White Pelican | | | | X | M | R |
| Double-crested Cormorant | | | | X | M | V |
| American Bittern | | | | X | R | C |
| Least Bittern | | | | X | M | R |
| Great Blue Heron | | | | X | R | C |
| Great Egret | | | | X | M | R |
| Snowy Egret | | | | X | M | R |
| Green-backed Heron | | | | X | R | R |
| Black-crowned Night Heron | | | | X | M | R |
| White-faced Ibis | | | | X | M | R |
| Tundra Swan | | | | X | M | R |
| Brant | | | | X | M | V |
| Canada Goose | | | | X | M | R |
| Green-winged Teal | | | | X | W, M | U |
| Mallard | | | | X | R | C |
| Northern Pintail | | | | X | W, M | U |
| Blue-winged Teal | | | | X | M | R |
| Cinnamon Teal | | | | X | R | C |
| Northern Shoveler | | | | X | M, W | R |
| Gadwall | | | | X | W | U |
| Eurasian Wigeon | | | | X | M | U |
| American Wigeon | | | | X | W | U |
| Canvas Back | | | | X | M | R |
| Redhead | | | | X | W | U |

TABLE E-1.2

COMMON AND CHARACTERISTIC BIRDS OF THE STUDY AREA*

| Common Name | Occurrence in Habitat** SH | TRS | RH | FH | Seasonal Occurrence*** | Abundance in Study Area**** |
|---|---|---|---|---|---|---|
| Common Loon | | | | X | M | V |
| Pied-billed Grebe | | | | X | R | C |
| Eared Grebe | | | | X | M | R |
| Western Grebe | | | | X | M | R |
| American White Pelican | | | | X | M | R |
| Double-crested Cormorant | | | | X | M | V |
| American Bittern | | | | X | R | C |
| Least Bittern | | | | X | M | R |
| Great Blue Heron | | | | X | R | C |
| Great Egret | | | | X | M | R |
| Snowy Egret | | | | X | M | R |
| Green-backed Heron | | | | X | R | R |
| Black-crowned Night Heron | | | | X | M | R |
| White-faced Ibis | | | | X | M | R |
| Tundra Swan | | | | X | M | R |
| Brant | | | | X | M | V |
| Canada Goose | | | | X | M | R |
| Green-winged Teal | | | | X | W, M | U |
| Mallard | | | | X | R | C |
| Northern Pintail | | | | X | W, M | U |
| Blue-winged Teal | | | | X | M | R |
| Cinnamon Teal | | | | X | R | C |
| Northern Shoveler | | | | X | M, W | R |
| Gadwall | | | | X | W | U |
| Eurasian Wigeon | | | | X | M | U |
| American Wigeon | | | | X | W | U |
| Canvas Back | | | | X | M | R |
| Redhead | | | | X | W | U |

Table 4-3 (continued)
Common and Characteristic Birds of the Study Area

| Common Name | Characteristic Habitat[b] | | | | Seasonal Occurrence[c] | Abundance in Study Area[d] |
|---|---|---|---|---|---|---|
| | SH | WH | MH | RH | | |
| Ring-necked Duck | | | | X | M | U |
| Oldsquaw | | | | X | M | R |
| Common Golden Eye | | | | X | M | R |
| Bufflehead | | | | X | M | R |
| Common Merganser | | | | X | M, W | R |
| Red-breasted Merganser | | | | X | M | R |
| Ruddy Duck | | | | X | R, M | C |
| Turkey Vulture | X | X | X | X | M, S | C |
| Osprey | | | | X | M | R |
| Black-shouldered Kite | X | | | X | M | R |
| Northern Harrier | X | | | X | R | R |
| Sharp-shinned Hawk | | X | | X | R | R |
| Cooper's Hawk | | X | | X | R | U |
| Red-shouldered Hawk | | X | | X | C | R |
| Swainson's Hawk | X | | | X | S | R |
| Red-tailed Hawk | X | X | X | X | R | U |
| Ferruginous Hawk | X | | | X | M, W | U |
| Golden Eagle | X | X | X | X | R | R |
| American Kestrel | X | X | X | X | R | C |
| Merlin | | X | | X | W | R |
| Prairie Falcon | X | X | X | X | R | R |
| Ring-necked Pheasant | | | | X | R | U |
| Gambel's Quail | X | | | X | R | C |
| Virginia Rail | | | | X | S | R |
| Sora | | | | X | R | U |
| Common Moorhen | | | | X | R | U |
| American Coot | | | | X | R | C |
| Sandhill Crane | | | | X | M | R |

Table 4-2 (continued)
Common and Characteristic Birds of the Study Area

| Common Name | Occurrence in Study Area | | | | Seasonal Occurrence[a] | Abundance in Study Area[b] |
|---|---|---|---|---|---|---|
| | SW | NW | NY | NY | | |
| Ring-necked Duck | | | | X | M | U |
| Oldsquaw | | | | X | M | R |
| Common Golden Eye | | | | X | M | R |
| Bufflehead | | | | X | M | R |
| Common Merganser | | | | X | M, W | R |
| Red-breasted Merganser | | | | X | M | R |
| Ruddy Duck | | | | X | R, M | C |
| Turkey Vulture | X | X | X | X | M, S | C |
| Osprey | | | | X | R | R |
| Black-crowned Night Heron | X | | | X | M | R |
| Northern Harrier | X | | | X | R | R |
| Sharp-shinned Hawk | | | X | X | R | R |
| Cooper's Hawk | | | X | X | R | U |
| Red-shouldered Hawk | | | X | X | R | R |
| Swainson's Hawk | X | | | X | S | R |
| Red-tailed Hawk | X | | X | X | R | C |
| Ferruginous Hawk | X | | | X | M, W | U |
| Golden Eagle | X | | X | X | R | R |
| American Kestrel | X | | X | X | R | C |
| Merlin | | | X | X | W | R |
| Prairie Falcon | X | | X | X | R | R |
| Ring-necked Pheasant | | | | X | R | U |
| Gambel's Quail | X | | | X | R | C |
| Virginia Rail | | | | X | S | R |
| Sora | | | | X | R | U |
| Common Moorhen | | | | X | R | U |
| American Coot | | | | X | R | C |
| Sandhill Crane | | | | X | M | R |

Table 4-3 (continued)
Common and Characteristic Birds of the Study Area

| Common Name | Characteristic Habitat[b] SH | WH | MH | RH | Seasonal Occurrence[c] | Abundance in Study Area[d] |
|---|---|---|---|---|---|---|
| Black-bellied Plover | | | | X | M | R |
| Semipalmated Plover | | | | X | M | R |
| Killdeer | | | | X | R | C |
| Black-necked Stilt | | | | X | M | R |
| American Avocet | | | | X | M | R |
| Greater Yellowlegs | | | | X | M | U |
| Lessor Yellowlegs | | | | X | M | U |
| Solitary Sandpiper | | | | X | S | U |
| Willet | | | | X | S | U |
| Spotted Sandpiper | | | | X | S | U |
| Whimbrel | | | | X | M | U |
| Long-billed Curlew | | | | X | W | R |
| Sandering | | | | X | M | U |
| Western Sandpiper | | | | X | M | U |
| Least Sandpiper | | | | X | M | U |
| Dunlin | | | | X | M | U |
| Long-billed Dowitcher | | | | X | M | R |
| Common Snipe | | | | X | W | U |
| Red-necked Phalarope | | | | X | M | U |
| Ring-billed Gull | | | | X | M | U |
| California Gull | | | | X | M, W | R |
| Forster's Tern | | | | X | S | U |
| Black Tern | | | | X | S | U |
| Rock Dove | | | | X | R | C |
| White-winged Dove | | | | X | S | R |
| Mourning Dove | X | X | X | X | R | C |
| Greater Roadrunner | X | | | X | R | U |
| Barn Owl | X | X | X | X | R | U |

Table 3-3 (continued)
Common and Characteristic Birds at the Study Area

| Common Name | Characteristic Habitat[a] | | | | Seasonal Occurrence | Abundance in Study Area[b] |
|---|---|---|---|---|---|---|
| | TM | WH | DM | PM | | |
| Black-bellied Plover | | | | X | M | R |
| Semipalmated Plover | | | | X | M | R |
| Killdeer | | | | X | R | C |
| Black-necked Stilt | | | | X | M | R |
| American Avocet | | | | X | M | R |
| Greater Yellowlegs | | | | X | M | U |
| Lesser Yellowlegs | | | | X | M | U |
| Solitary Sandpiper | | | | X | S | U |
| Willet | | | | X | S | U |
| Spotted Sandpiper | | | | X | S | U |
| Whimbrel | | | | X | M | U |
| Long-billed Curlew | | | | X | W | R |
| Sanderling | | | | X | M | U |
| Western Sandpiper | | | | X | M | U |
| Least Sandpiper | | | | X | M | U |
| Dunlin | | | | X | M | U |
| Long-billed Dowitcher | | | | X | M | R |
| Common Snipe | | | | X | W | U |
| Red-necked Phalarope | | | | X | M | U |
| Ring-billed Gull | | | | X | M | U |
| California Gull | | | | X | W, M | R |
| Forster's Tern | | | | X | S | U |
| Black Tern | | | | X | S | U |
| Rock Dove | | | | X | R | C |
| White-winged Dove | | | | X | S | R |
| Mourning Dove | X | X | X | X | R | C |
| Greater Roadrunner | X | | | X | R | U |
| Barn Owl | X | X | X | X | R | U |

Table 4-3 (continued)
Common and Characteristic Birds of the Study Area

| Common Name | Characteristic Habitat[b] | | | | Seasonal Occurrence[c] | Abundance in Study Area[d] |
|---|---|---|---|---|---|---|
| | SH | WH | MH | RH | | |
| Flammulated Owl | | | X | | R | R |
| Western Screech Owl | | X | | X | R | U |
| Great Horned Owl | X | X | X | X | R | U |
| Burrowing Owl | X | | | | R | R |
| Long-eared Owl | | | | X | R | U |
| Short-eared Owl | X | | | X | R | V |
| Lesser Nighthawk | X | | | X | S | U |
| Common Poorwill | X | | | | S | U |
| Vaux's Swift | | X | | | S | U |
| White-throated Swift | | | X | X | S | U |
| Black-chinned Hummingbird | | | | X | S | U |
| Anna's Hummingbird | | X | | X | R | U |
| Costa's Hummingbird | X | X | | X | S | R |
| Rufous Hummingbird | | X | X | | S | U |
| Belted Kingfisher | | | | X | R | C |
| Yellow-bellied Sapsucker | | X | | X | W | R |
| Ladder-backed Woodpecker | | X | | X | R | C |
| Nuttall's Woodpecker | | | | X | R | U |
| Downy Woodpecker | | X | | X | R | C |
| Hairy Woodpecker | | X | | X | R | U |
| Northern Flicker | | | | X | R | C |
| Olive-sided Flycatcher | | | X | | M | U |
| Western Wood-Pewee | | X | X | X | S | U |
| Willow Flycatcher | | | | X | M | U |
| Hammond's Flycatcher | | X | X | X | M | U |
| Dusky Flycatcher | | X | X | X | M | U |
| Gray Flycatcher | | X | | X | M | R |
| Western Flycatcher | | | | X | S | C |

Table 4-2 (cont'd)
Common and Characteristic Birds of the Shrub Area

| Common Name | Characteristic Habitats: 321 | 323 | 341 | 127 | Seasonal Occurrence | Abundance in Study Area |
|---|---|---|---|---|---|---|
| Flammulated Owl | | | X | | R | R |
| Western Screech Owl | | X | | X | R | U |
| Great Horned Owl | X | X | X | X | R | U |
| Burrowing Owl | X | | | | S | R |
| Long-eared Owl | | | | X | R | U |
| Short-eared Owl | X | | | X | R | U |
| Lesser Nighthawk | X | | | X | S | U |
| Common Poorwill | X | | | | S | U |
| Vaux's Swift | | X | | | S | U |
| White-throated Swift | | | X | X | S | U |
| Black-chinned Hummingbird | | | | X | S | U |
| Anna's Hummingbird | | X | | X | R | U |
| Costa's Hummingbird | X | X | | X | S | R |
| Rufous Hummingbird | | X | X | | S | U |
| Belted Kingfisher | | | | X | R | C |
| Yellow-bellied Sapsucker | | X | | X | W | R |
| Ladder-backed Woodpecker | | X | | X | R | C |
| Nuttall's Woodpecker | | | | X | R | U |
| Downy Woodpecker | | X | | X | R | C |
| Hairy Woodpecker | | X | | X | W | U |
| Northern Flicker | | | | X | R | C |
| Olive-sided Flycatcher | | | X | | M | U |
| Western Wood-Pewee | | X | X | X | S | U |
| Willow Flycatcher | | | | X | M | U |
| Hammond's Flycatcher | | X | X | X | M | U |
| Dusky Flycatcher | | X | | X | M | U |
| Gray Flycatcher | | X | | X | M | R |
| Western Flycatcher | | | | X | S | C |

Table 4-3 (continued)
Common and Characteristic Birds of the Study Area

| Common Name | Characteristic Habitat[b] | | | | Seasonal Occurrence[c] | Abundance in Study Area[d] |
|---|---|---|---|---|---|---|
| | SH | WH | MH | RH | | |
| Black Phoebe | | | | X | R | C |
| Sam's Phoebe | | | | X | M | U |
| Vermilion Flycatcher | | | | X | W | R |
| Ash-throated Flycatcher | | X | | | S | U |
| Brown-crested Flycatcher | | | | X | S | U |
| Western Kingbird | | X | | X | S | C |
| Horned Lark | X | | | | R | C |
| Purple Martin | | | | X | S | U |
| Tree Swallow | | | | X | S | U |
| Violet-Green Swallow | | X | | | S | U |
| Northern Rough-winged Swallow | | | | X | S | C |
| Bank Swallow | | | | X | S | U |
| Cliff Swallow | | | | X | S | C |
| Barn Swallow | | | | X | S | C |
| Scrub Jay | | X | | X | R | R |
| Pinyon Jay | | X | | | R | C |
| Common Raven | X | X | X | X | R | C |
| Mountain Chickadee | | | X | | R | C |
| Plain Titmouse | | X | X | | R | C |
| Verdin | X | | | X | R | C |
| Bushtit | | X | | X | R | C |
| Red-breasted Nuthatch | | | X | X | W | R |
| White-breasted Nuthatch | | | X | | S | V |
| Brown Creeper | | X | | X | R | R |
| Cactus Wren | X | X | | | R | C |
| Rock Wren | X | X | X | X | R | C |
| Canyon Wren | | X | X | X | R | U |

Table 9-2 (continued)
Common and Distinctive Birds of the Study Area

| Common Name | Distinctiveness Criteria[1] | | | | Seasonal Occurrence[2] | Abundance in Study Area[3] |
|---|---|---|---|---|---|---|
| | EG | WH | MH | HH | | |
| Black Phoebe | | | | X | R | C |
| Say's Phoebe | | | | X | U | U |
| Vermilion Flycatcher | | | | X | W | R |
| Ash-throated Flycatcher | | | X | | S | U |
| Brown-crested Flycatcher | | | | X | S | U |
| Western Kingbird | | | X | X | S | C |
| Horned Lark | X | | | | R | C |
| Purple Martin | | | | X | S | U |
| Tree Swallow | | | | X | S | U |
| Violet-Green Swallow | | | X | | S | U |
| Northern Rough-winged Swallow | | | | X | S | C |
| Bank Swallow | | | | X | S | U |
| Cliff Swallow | | | | X | S | C |
| Barn Swallow | | | | X | S | C |
| Scrub Jay | | | X | X | R | R |
| Pinyon Jay | | | X | | R | C |
| Common Raven | | X | X | X | R | C |
| Mountain Chickadee | | | | X | R | C |
| Plain Titmouse | | | X | X | R | C |
| Verdin | | X | | X | R | C |
| Bushtit | | | X | X | R | C |
| Red-breasted Nuthatch | | | | X | W | R |
| White-breasted Nuthatch | | | | X | S | U |
| Brown Creeper | | | X | X | R | R |
| Cactus Wren | | X | X | | R | C |
| Rock Wren | | X | X | X | R | C |
| Canyon Wren | | | X | X | R | U |

Table 4-3 (continued)
Common and Characteristic Birds of the Study Area

| Common Name | Characteristic Habitat[b] | | | | Seasonal Occurrence[c] | Abundance in Study Area[d] |
|---|---|---|---|---|---|---|
| | SH | WH | MH | RH | | |
| Bewick's Wren | X | X | | X | R | C |
| House Wren | | | X | X | S | C |
| Marsh Wren | | | | X | R | C |
| Ruby-crowned Kinglet | | | | X | W | U |
| Blue-Gray Gnatcatcher | | | | X | R | R |
| Black-tailed Gnatcatcher | | | | X | R | U |
| Western Bluebird | | X | | X | R | C |
| Mountain Bluebird | | | X | | R | U |
| Townsend's Solitare | | X | X | | W | R |
| Swainson's Thrush | | | | X | M | U |
| Hermit Thrush | | | | X | W, M | U |
| American Robin | | X | X | X | W, M | C |
| Varied Thrush | | | X | X | W | U |
| Northern Mockingbird | X | X | | X | R | C |
| Sage Thrasher | X | | | | M | U |
| Bendire's Thrasher | | X | | | S | C |
| California Thrasher | | | | X | M | R |
| LeConte's Thrasher | X | | | | R | R |
| Water Pipit | | | | X | W | C |
| Bohemian Waxwing | | | X | | M, W | U |
| Cedar Waxwing | | | | X | W | R |
| Painopepla | | | | X | R | U |
| Loggerhead Shrike | X | X | | X | R | C |
| European Starling | | | | X | R | C |
| Bell's Vireo | | | | X | S | U |
| Gray Vireo | X | X | | | S | R |
| Solitary Vireo | | | X | | S | R |
| Warbling Vireo | | | | X | S | U |

Table 5-3 (continued)
Common and Characteristic Birds of the Study Area

| Common Name | Characteristic Habitat? | | | | General Occurrence | Abundance in Study Area |
|---|---|---|---|---|---|---|
| | M1 | M2 | M3 | F1 | | |
| Bewick's Wren | X | X | | X | R | C |
| House Wren | | | X | X | [illegible] | C |
| Marsh Wren | | | | X | R | C |
| Ruby-crowned Kinglet | | | | X | W | U |
| Blue-Gray Gnatcatcher | | | | X | R | R |
| Black-tailed Gnatcatcher | | | | X | R | U |
| Western Bluebird | | X | | X | R | C |
| Mountain Bluebird | | | X | | R | U |
| Townsend's Solitaire | | X | X | | W | R |
| Swainson's Thrush | | | | X | M | U |
| Hermit Thrush | | | | X | W, M | U |
| American Robin | | X | X | X | W, M | C |
| Varied Thrush | | | X | X | W | R |
| Northern Wockingbird | X | X | | X | R | C |
| Sage Thrasher | X | | | | M | U |
| Bendire's Thrasher | | X | | | S | C |
| California Thrasher | | | | X | M | R |
| LeConte's Thrasher | X | | | | R | R |
| Water Pipit | | | | X | W | C |
| Bohemian Waxwing | | | X | | M, W | U |
| Cedar Waxwing | | | | X | W | R |
| Ptilogonys | | | | X | R | U |
| Loggerhead Shrike | X | X | | X | R | C |
| European Starling | | | | X | R | C |
| Bell's Vireo | | | | X | S | U |
| Gray Vireo | X | X | | | S | R |
| Solitary Vireo | | | X | | S | R |
| Warbling Vireo | | | | X | S | U |

Table 4-3 (continued)
Common and Characteristic Birds of the Study Area

| Common Name | Characteristic Habitat[b] | | | | Seasonal Occurrence[c] | Abundance in Study Area[d] |
|---|---|---|---|---|---|---|
| | SH | WH | MH | RH | | |
| Orange-crowned Warbler | | | | X | S | C |
| Nashville Warbler | | | X | | S | U |
| Virginia's Warbler | | | X | | S | V |
| Lucy's Warbler | | | | X | S | R |
| Yellow Warbler | | | | X | S | U |
| Yellow-rumped Warbler | X | X | | X | W | C |
| Black-throated Gray Warbler | | X | X | | M | U |
| Townsend's Warbler | X | X | | X | M | U |
| Hermit Warbler | | | | X | M | U |
| American Redstart | | | | X | S | V |
| MacGillivray's Warbler | | | X | | M, S | R |
| Common Yellowthroat | | | | X | S | U |
| Wilson's Warbler | | | | X | M | C |
| Painted Redstart | | | X | | M, S | R |
| Yellow-breasted Chat | | | X | | S | U |
| Hepatic Tanager | | | X | | R | R |
| Summer Tanager | | | | X | M | U |
| Western Tanager | | | X | | S | C |
| Rose-breasted Grosbeak | | | X | | M | R |
| Black-headed Grosbeak | | | X | | S | C |
| Blue Grosbeak | | | | X | S | U |
| Lazuli Bunting | | | | X | S | R |
| Green-tailed Towhee | | | X | | S | C |
| Rufous-sided Towhee | | | X | | R | C |
| Rufous-crowned Sparrow | | | X | | R | R |
| Chipping Sparrow | | X | | X | M | R |
| Clay-colored Sparrow | | | | X | M | V |

Table 4-3 (continued)
Common and Characteristic Birds of the Study Area

| Common Name | Characteristic Habitat: BH | Sec | MH | Jun | Seasonal Occurrence | Abundance in Study Area |
|---|---|---|---|---|---|---|
| Orange-crowned Warbler | | | | X | S | C |
| Nashville Warbler | | | X | | S | U |
| Virginia's Warbler | | | X | | S | R |
| Lucy's Warbler | | | | X | S | R |
| Yellow Warbler | | | | X | S | U |
| Yellow-rumped Warbler | X | X | | X | W | C |
| Black-throated Gray Warbler | | X | X | | M | U |
| Townsend's Warbler | X | X | | X | M | U |
| Hermit Warbler | | | | X | M | U |
| American Redstart | | | | X | S | R |
| MacGillivray's Warbler | | | X | | M, S | R |
| Common Yellowthroat | | | | X | S | U |
| Wilson's Warbler | | | | X | M | C |
| Painted Redstart | | | X | | M, S | R |
| Yellow-breasted Chat | | | X | | S | R |
| Hepatic Tanager | | | X | | R | R |
| Summer Tanager | | | | X | M | U |
| Western Tanager | | | X | | S | C |
| Rose-breasted Grosbeak | | | X | | M | R |
| Black-headed Grosbeak | | | X | | S | C |
| Blue Grosbeak | | | | X | S | U |
| Lazuli Bunting | | | | X | S | R |
| Green-tailed Towhee | | | X | | S | C |
| Rufous-sided Towhee | | | X | | R | C |
| Rufous-crowned Sparrow | | | X | | R | R |
| Chipping Sparrow | | X | | X | M | R |
| Clay-colored Sparrow | | | | X | M | V |

Table 4-3 (continued)
Common and Characteristic Birds of the Study Area

| Common Name | Characteristic Habitat[b] | | | | Seasonal Occurrence[c] | Abundance in Study Area[d] |
|---|---|---|---|---|---|---|
| | SH | WH | MH | RH | | |
| Brewer's Sparrow | | | X | | R | C |
| Black-chinned Sparrow | | | X | | S | C |
| Vesper Sparrow | X | | | | W | C |
| Lark Sparrow | | | | X | R | C |
| Black-throated Sparrow | X | | | | R | C |
| Sage Sparrow | X | | | | R | U |
| Savannah Sparrow | | | | X | R | C |
| Grasshopper Sparrow | X | | | | S | U |
| Fox Sparrow | | | | X | M | R |
| Song Sparrow | | | | X | R | C |
| Golden-crowned Sparrow | | X | | X | W | U |
| White-crowned Sparrow | X | X | | | W | C |
| Dark-eyed Junco | X | X | X | X | W | C |
| Red-winged Blackbird | | | | X | R | C |
| Tri-colored Blackbird | | | | X | M | R |
| Western Meadowlark | | | | X | R | C |
| Yellow-headed Blackbird | | | | X | M, S | R |
| Brewer's Blackbird | | X | X | X | R | C |
| Brown-headed Cowbird | | X | X | X | R | U |
| Hooded Oriole | | | | X | S | R |
| Northern Oriole | | X | | X | S | C |
| Scott's Oriole | | X | | | S | C |
| Cassin's Finch | | | X | | W | R |
| House Finch | X | | | X | R | C |
| Lesser Goldfinch | | | | X | R | C |
| Lawrence's Goldfinch | | X | X | X | M | R |
| American Goldfinch | | | | X | R | U |

Table 4-3 (continued)
Common and Characteristic Birds of the Study Area

| Common Name | Guild / Utility Habitats: Tra | Sen | Mid | Riv | Seasonal Occurrence | Abundance in Study Area |
|---|---|---|---|---|---|---|
| Brewer's Sparrow | | | X | | R | C |
| Black-chinned Sparrow | | | X | | S | C |
| Vesper Sparrow | X | | | | W | C |
| Lark Sparrow | | | | X | R | C |
| Black-throated Sparrow | X | | | | R | C |
| Sage Sparrow | X | | | | R | U |
| Savannah Sparrow | | | | X | R | C |
| Grasshopper Sparrow | X | | | | S | U |
| Fox Sparrow | | | | X | W | R |
| Song Sparrow | | | | X | R | C |
| Golden-crowned Sparrow | | X | | | W | U |
| White-crowned Sparrow | X | X | | | W | C |
| Dark-eyed Junco | X | X | X | X | W | C |
| Red-winged Blackbird | | | | X | R | C |
| Tri-colored Blackbird | | | | X | W | R |
| Western Meadowlark | | | | X | R | C |
| Yellow-headed Blackbird | | | | X | M | R |
| Brewer's Blackbird | | X | X | X | R | C |
| Brown-headed Cowbird | | X | X | X | R | U |
| Hooded Oriole | | | | X | S | R |
| Northern Oriole | | X | | X | S | R |
| Scott's Oriole | | X | | | S | C |
| Cassin's Finch | | | X | | W | R |
| House Finch | X | | | X | R | C |
| Lesser Goldfinch | | | | X | R | C |
| Lawrence's Goldfinch | | X | X | | M | R |
| American Goldfinch | | | | X | R | U |

Table 4-3 (continued)
Common and Characteristic Birds of the Study Area

| Common Name | Characteristic Habitat[b] | | | | Seasonal Occurrence[c] | Abundance in Study Area[d] |
|---|---|---|---|---|---|---|
| | SH | WH | MH | RH | | |
| Evening Grosbeak | | | X | X | W | R |
| House Sparrow | | | | X | R | C |

[a]These are common and characteristic birds of the study area; this is not intended to be a comprehensive avifauna list.

[b]Habitat types are described in the text. SH = scrub habitats (creosote bush, blackbush, and saltbush scrub); WH = woodland habitats (Joshua tree and pinyon-juniper woodlands); MH = montane habitats (white fir forest); and RH = riparian woodland, desert wash, and other wetland habitats.

[c]R = resident, M = spring and/or fall migrant, W = winter visitor, S = summer visitor.

[d]C = common, U = uncommon, R = rare, V = very rare.

[e]Observed during field surveys, November 30 to December 8, 1984.

## TABLE 4-4
## COMMON AND CHARACTERISTIC MAMMALS OF THE STUDY AREA[a]

| Common Name | Scientific Name | Characteristic Habitat[b] | | | |
|---|---|---|---|---|---|
| | | SH | WH | MH | RH |
| Merriam's shrew | Sorex merriami | | X | X | X |
| Desert shrew | Notiosorex crawfordi | X | | | X |
| Leaf-nosed bat | Macrotus californicus | X | | | X |
| Yuma myotis | Myotis yumanensis | X | | | X |
| Long-eared myotis | Myotis evotis | | | X | |
| Fringe-tailed myotis | Myotis thysanodes | X | X | | X |
| Long-legged myotis | Myotis volans | | | X | |
| California myotis | Myotis californicus | | | X | |
| Small-footed myotis | Myotis subulatus | | X | X | |
| Silver-haired bat | Lasionycteris noctiuagans | | | X | X |
| Western pipistrel | Pipistrellus hesperus | X | X | | X |
| Big brown bat | Eptesicus fuscus | | X | | X |
| Hoary bat | Lagiurus cinereus | X | X | X | |
| Spotted bat | Euderma maculatum | | X | X | |
| Pallid bat | Antrozous pallidus | X | X | | X |
| Brazilian free-tailed bat | Tadarida braziliensis | X | X | | |
| Big free-tailed bat | Tadarida molassa | X | X | | |
| Mountain cottontail | Sylvilagus nuttalii | | X | X | |
| Desert cottontail | Sylvilagus audubonii | X | X | | |
| Black-tailed jackrabbit | Lepus californicus | X | | | |
| Panamint chipmunk | Tamias panamintus | | X | | |
| White-tailed antelope ground squirrel | Ammospermophilus leucurus | X | | | |
| Mohave ground squirrel | Spermophilus mohavensis | X | | | |
| Round-tailed ground squirrel | Spermophilus tereticaudus | X | | | |
| Botta's pocket gopher | Thomomys bottae | | | X | |
| Little pocket mouse | Perognathus longimembris | X | X | | |
| San Joaquin pocket mouse | Perognathus inornatus | X | | | |

TABLE 4-3

COMMON AND CHARACTERISTIC MAMMALS OF THE STUDY AREA[a]

| Common Name | Scientific Name | Conservation Status[b] | | | |
|---|---|---|---|---|---|
| | | [illegible] | [illegible] | [illegible] | [illegible] |
| Merriam's shrew | Sorex merriami | | X | X | X |
| Desert shrew | Notiosorex crawfordi | X | | | X |
| Leaf-nosed bat | Macrotus californicus | X | | | X |
| Yuma myotis | Myotis yumanensis | X | | | X |
| Long-eared myotis | Myotis evotis | | X | | |
| Fringe-tailed myotis | Myotis thysanodes | X | | X | X |
| Long-legged myotis | Myotis volans | | X | | |
| California myotis | Myotis californicus | | X | | |
| Small-footed myotis | Myotis ciliolabrum | | X | X | |
| Silver-haired bat | Lasionycteris noctivagans | | X | | X |
| Western pipistrel | Pipistrellus hesperus | X | | X | X |
| Big brown bat | Eptesicus fuscus | | | X | X |
| Hoary bat | Lasiurus cinereus | X | | X | X |
| Spotted bat | Euderma maculatum | | | X | X |
| Pallid bat | Antrozous pallidus | X | | X | X |
| Brazilian free-tailed bat | Tadarida brasiliensis | X | | X | |
| Big free-tailed bat | Tadarida molossa | X | | X | |
| Mountain cottontail | Sylvilagus nuttallii | | | X | X |
| Desert cottontail | Sylvilagus audubonii | X | | X | |
| Black-tailed jackrabbit | Lepus californicus | X | | | |
| Fremont chipmunk | Tamias senex | | X | | |
| White-tailed antelope ground squirrel | Ammospermophilus leucurus | X | | | |
| Mohave ground squirrel | Spermophilus mohavensis | X | | | |
| Round-tailed ground squirrel | Spermophilus tereticaudus | X | | | |
| Botta's pocket gopher | Thomomys bottae | | | | X |
| Little pocket mouse | Perognathus longimembris | X | | X | |
| San Joaquin pocket mouse | Perognathus inornatus | X | | | |

Table 4-4 (continued)
Common and Characteristic Mammals of the Study Area

| Common Name | Scientific Name | Characteristic Habitat[b] | | | |
|---|---|---|---|---|---|
| | | SH | WH | MH | RH |
| Long-tailed pocket mouse | Perognathus formosus | X | | | |
| Desert pocket mouse | Perognathus penicillatus | X | | | |
| Panamint kangaroo rat | Dipodomys panamintinus | X | X | | |
| Merrian's kangaroo rat | Dipodomys merriami | X | | | |
| Desert kangaroo rat | Dipodomys deserti | X | | | |
| Western harvest mouse | Reithrodontomys megalotis | | | | X |
| Canyon mouse | Peromyscus erinitus | | X | | |
| Cactus mouse | Peromyscus eremicus | X | X | | |
| Deer mouse | Peromyscus maniculatus | X | X | X | X |
| Brush mouse | Peromyscus boylii | | X | | |
| Pinon mouse | Peromyscus truei | | X | | |
| Southern grasshopper mouse | Onychomys torridus | X | | | |
| Desert woodrat | Neotoma lepida | X | X | | |
| Mohave River vole | Microtus californicus mohavensis | | | | X |
| House mouse | Mus musculus | X | X | | X |
| Coyote | Canis latrans | X | X | X | X |
| Kit fox | Vulpes macrotis | X | X | | |
| Gray fox | Urocyon cinereo argenteus | | X | | |
| Ringtail | Bassariscus astutus | | X | | |
| Badger | Taxadea taxus | X | X | X | |
| Spotted skunk | Spilogale putorius | X | X | | |
| Striped skunk | Mephitis mephitis | | | | X |
| Bobcat | Felis rufus | X | X | X | |
| Mule deer | Odocoileus hemionus | | X | X | |
| Nelson's bighorn sheep | Ovis canadensis nelsoni | | | X | |

[a]These are common and characteristic mammals of the study area. This is not intended to be a comprehensive faunal list.

Table 4-4 (continued)
Common and Characteristic Mammals of the Study Area

| Common Name | Scientific Name | Characteristic Habitat[a] | | | |
|---|---|---|---|---|---|
| | | WH | WH | MH | PH |
| Long-tailed pocket mouse | Perognathus formosus | X | | | |
| Desert pocket mouse | Perognathus penicillatus | X | | | |
| Panamint kangaroo rat | Dipodomys panamintinus | X | X | | |
| Merriam's kangaroo rat | Dipodomys merriami | X | | | |
| Desert kangaroo rat | Dipodomys deserti | X | | | |
| Western harvest mouse | Reithrodontomys megalotis | | | | X |
| Canyon mouse | Peromyscus crinitus | | X | | |
| Cactus mouse | Peromyscus eremicus | X | X | | |
| Deer mouse | Peromyscus maniculatus | X | X | X | X |
| Brush mouse | Peromyscus boylii | | X | | |
| Pinon mouse | Peromyscus truei | | X | | |
| Southern grasshopper mouse | Onychomys torridus | X | | | |
| Desert woodrat | Neotoma lepida | X | X | | |
| Mohave River vole | Microtus californicus mohavensis | | | | X |
| House mouse | Mus musculus | X | X | | X |
| Coyote | Canis latrans | X | X | X | X |
| Kit fox | Vulpes macrotis | X | X | | |
| Gray fox | Urocyon cinereoargenteus | | X | | |
| Ringtail | Bassaris astuta | | X | | |
| Badger | Taxidea taxus | X | X | X | |
| Spotted skunk | Spilogale putorius | X | X | | |
| Striped skunk | Mephitis mephitis | | | | X |
| Bobcat | Felis rufus | X | X | X | |
| Mule deer | Odocoileus hemionus | | X | X | |
| Nelson's bighorn sheep | Ovis canadensis nelsoni | | | X | |

[a]These are common and characteristic mammals of the study area. This is not intended to be a comprehensive faunal list.

Table 4-4 (continued)
Common and Characteristic Mammals of the Study Area

| Common Name | Scientific Name | Characteristic Habitat[b] | | | |
|---|---|---|---|---|---|
| | | SH | WH | MH | RH |

Footnotes (continued)

[b]Habitat types are described in the text. SH = scrub habitats (creosote bush, blackbush, and saltbush scrub); WH = woodland habitats (Joshua tree and pinyon-juniper woodlands); MH = montane habitats (white fir forest); and RH = riparian woodland, desert wash, and wetland habitats.

TABLE 4-5
PLANT SPECIES OF SPECIAL INTEREST IN THE STUDY AREA

| Scientific Name[a] | Common Name[a] | Growth Form[b] | Flowering Period | Federal Candidate Status[c] 1980 | Federal Candidate Status[c] 1983 | BLM Sensitive Species[d] | Nevada Native Plant Society List[e] | California Native Plant Society List[f] 1980 | California Native Plant Society List[f] 1984 | Characteristic Vegetation Type[g] | Regional Distribution | Known or Potential Occurrence in the Study Area[h] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Astragalus jaegerianus | Jaeger milkvetch | PH | April-June | 1 | 2 | CA | - | 2 | IB | CBS, JTW; 300-3000 ft. | CA; 30 miles northeast of Yermo on granite hillsides; approximately 10 square miles on Coolgardie Mesa between Barstow and Goldstone. | Known populations on Coolgardie Mesa north of Barstow; likely to occur in scattered locations in Mud Hills, on Lane Mountain, and possibly in Calico Mountains. |
| Chorizanthe spinosa | Mojave spine-flower | AH | April-July | 1 | 2 | CA | - | 2 | 4 | CBS, JTW; 2500-3500 ft. | CA; alluvial fans, sandy washes, and flats; scattered populations in western Mojave Desert, especially on Edwards Air Force Base. | Known populations near Kramer Junction and Adelanto; likely to occur in scattered areas in western portion of study area. |
| Coryphantha vivipara var. alversonii | foxtail cactus | C | May-June | 2 | 2 | CA | - | 2 | IB | CBS, JTW; 2000-5000 ft. | CA; stony slopes; Little San Bernardino Mountains to Eagle and Chuckwalla mountains. | Expected to be very rare in the study area; only one site known on Clark Mountain. |
| Cymopterus deserticola | desert cymopterus | PH | March-May | 1 | 2 | - | - | 2 | IB | CBS, JTW; 2300-4300 ft. | CA; very rare in flats of old dune areas from near Victorville to Kramer Junction and Edwards Air Force Base. | Known populations at Kramer Junction and Apple Valley; possible occurrence in small localized site in western portion of study area. |

Table 4-5 (continued)
Plant Species of Special Interest in the Study Area

| Scientific Name[a] | Common Name[a] | Growth Form[b] | Flowering Period | Federal Candidate Status[c] 1980 | Federal Candidate Status[c] 1983 | BLM Sensitive Species[d] | Nevada Native Plant Society List[e] | California Native Plant Society List[f] 1980 | California Native Plant Society List[f] 1984 | Characteristic Vegetation Type[g] | Regional Distribution | Known or Potential Occurrence in the Study Area[h] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eriophyllum mohavensis | Barstow woolly sunflower | AH | April-May | 1 | 2 | CA | - | 2 | 1B | CBS; 2000-3000 ft. | CA; sandy or rocky places; flat or sloping; near Barstow and Kramer Junction; very rare. | Known from small site near Barstow and larger populations northeast of Kramer Junction; possible small populations in western portion of study area. |
| Penstemon bicolor ssp. bicolor and roseus | bicolored penstemon | PH | May-June | 1 | 2 | - | W | - | - | CBS; 2000-5000 ft. | NV; washes and roadsides, southeast slope of Spring Mountains, Kyle Canyon south to Jean and McCullough Mountains. | Known populations in McCullough Mountains; possible additional populations nearby. |
| Phacelia anelsonii | Nelson's phacelia | AH | April-May | 2 | 2 | - | OR | 4 | 2 | CBS, BS, JTW, PJ; 2000-6000 ft. | CA and NV; wide distribution on disturbed and rocky soils; washes, slope bases, and talus; small local rare populations. | Known population site in McCullough Mountains; possible but unlikely in other areas of McCullough and Clark mountains. |
| Puccinella parishii | Parish's alkali grass | AG | April-May | 1 | 2 | CA | - | 2 | 1B | JTW; CBS; 2900 ft. | CA; alkaline seep at Rabbit Springs, Lucerne Valley; possible at Kramer Junction and Edwards Air Force Base. | Known but suspect population near Kramer Junction; possible but unlikely additional small localized populations in western study area. |

Table 4-5 (continued)
Plant Species of Special Interest in the Study Area

| Scientific Name[a] | Common Name[a] | Growth Form[b] | Flowering Period | Federal Candidate Status[c] 1980 | Federal Candidate Status[c] 1983 | BLM Sensitive Species[d] | Nevada Native Plant Society List[e] | California Native Plant Society List[f] 1980 | California Native Plant Society List[f] 1984 | Characteristic Vegetation Type[g] | Regional Distribution | Known or Potential Occurrence in the Study Area[h] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sclerocactus polyancistrus | Mojave fishhook cactus | C | April-June | 1 | 2 | CA | W | 2 | 4 | CBS, SS, PJ; 2500-6500 ft. | CA and NV (Nye County); flats, hillsides, and steep slopes from Red Rock Canyon northeast to Nevada in southwest San Bernardino and Inyo counties. | Several known populations in western portion of study area; additional small sites possible nearby. |
| Sphaeralcea rusbyi ssp. eremicola | Rusby's desert mallow | AH | May-June | 1 | 2 | CA | - | 2 | 1B | CBS, BS; 3000-4500 ft. | CA; Panamint Mountains (Inyo County) and one site in Clark Mountains; rare. | One known population in the Clark Mountains, Keany Pass; additional populations are possible in nearby areas. |

[a] Scientific and common names follow USFWS (1980, 1983), Munz (1974), Smith et al. (1980, 1981, 1982), and Mozingo and Williams (1980).

[b] PH = perennial herb, AH = annual herb, C = cactus.

[c] Federal candidate status from USFWS (1980, 1983).
Category 1 = taxa for which sufficient information is available to support the biological appropriateness for official listing.
Category 2 = taxa for which sufficient information is available to indicate possible listing, but for which additional data are required on vulnerability and threats. Man species were placed in lower candidate categories in the updated 1983 listing (USFWS 1983) based on new information that indicated their distribution was more widesprea than previously believed.

[d] California BLM sensitive species from BLM (1984). No Nevada BLM sensitive species list has been developed.

Table 4-5 (continued)
Plant Species of Special Interest in the Study Area

| Scientific Name[a] | Common Name[a] | Growth Form[b] | Flowering Period | Federal Candidate Status[c] 1980 | Federal Candidate Status[c] 1983 | BLM Sensitive Species[d] | Nevada Native Plant Society List[e] | California Native Plant Society List[f] 1980 | California Native Plant Society List[f] 1984 | Characteristic Vegetation Type[g] | Regional Distribution | Known or Potential Occurrence in the Study Area[h] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

Footnotes (continued)

e Sensitive species list developed annually by NNPS (1984) which includes three categories in decreasing order of rarity and/or endangerment: (1) sensitive species, (2) wato list (w), and (3) other rare species (OR).

f From the 1980 CNPS Rare Plant Inventory (Smith et al. 1980, 1981, 1982) and 1984 Inventory (Smith and York 1984). The 1980 categories include: List 2 = rare an endangered; List 3 = rare, but not endangered; and List 4 = rare in California, but common elsewhere. The 1984 categories include: List IB = rare and endangered; List 2 plants rare in California, but common elsewhere; List 3 = plants requiring additional data or abundance and distribution; and List 4 = plants of limited distribution.

g CBS = creosote bush scrub; JTW = Joshua tree woodland; BS = blackbush scrub; SS = saltbush scrub; PJ = pinyon-juniper woodland.

h Location of known populations in the study area shown in Figure 4-2, Map Volume.

TABLE 4-6
VEGETATION TYPES TRAVERSED BY THE ALTERNATIVE CORRIDORS[a]

| Link No. | Miles Traversed by Corridors | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Vegetation Types[b] | | | | | | | | | | | |
| | CBS | | | | BS | | | | | | | |
| | CBS | CBS/SS | CBS/JTW | SS | BS | BS/JTW | JTW | DW | RW | Barren | Cropland | Total Miles |
| 0 | 6.0 | 7.4 | | | | | | 0.1(1) | | | | 13.5 |
| 1 | 15.1 | | | | | | | 1.5(1) | | | | 16.6 |
| 2 | 5.5 | 1.0 | | | | | | | | | | 6.5 |
| 3 | 4.0 | 0.2 | | 4.2 | | | | | | | | 8.4 |
| 4 | 1.0 | 0.9 | | | | | | | | | | 1.9 |
| 5a | 0.2 | | | | | | | | | | | 0.2 |
| 5b | 3.5 | | | 0.5 | | | | | | 0.8 | | 4.8 |
| 5c | 5.5 | | | | 5.8 | | | | | 1.0 | | 12.3 |
| 6 | 47.2 | | 23.5 | 1.6 | 10.5 | | | -(5) | | 0.5 | | 83.3 |
| 7 | | 0.2 | 5.8 | 1.7 | | 5.8 | | -(1) | | | | 13.5 |
| 8 | 1.4 | 1.3 | 2.7 | 2.8 | | 4.7 | | -(1) | | | | 12.9 |
| 9 | 19.9 | | 1.0 | 0.5 | | 2.0 | | 0.8(1) | | 0.8 | | 25.0 |
| 10 | 14.6 | | 2.7 | | | 2.6 | | | | | | 19.9 |
| 11 | 13.2 | | | 2.8 | | | | 2.5(2) | | 2.0 | | 20.5 |
| 12 | 3.0 | | | 1.0 | | | | | | 0.9 | | 4.9 |
| 13 | 10.6 | | | | | | | | | | | 10.6 |
| 14 | 1.9 | | | | | | | 3.0(1) | | | | 4.9 |
| 15 | 4.5 | | | | | | | 0.5(1) | | | | 5.0 |

Table 4-6 (continued)
Vegetation Types Traversed by the Alternative Corridors

| Link No. | Miles Traversed by Corridors | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Vegetation Types[b] | | | | | | | | | | | |
| | CBS | | | | BS | | | | | | | |
| | CBS | CBS/SS | CBS/JTW | SS | BS | BS/JTW | JTW | DW | RW | Barren | Cropland | Total Miles |
| 16 | 5.4 | | | | | | | 3.2(1) | | | | 8.6 |
| 17 | 4.8 | | | | | | | 0.5(1) | | | | 5.3 |
| 18 | 3.7 | | | | | | | | | | | 3.7 |
| 19 | 8.0 | | | | | | | -(1) | | | | 8.0 |
| 20a | 14.6 | | | 4.2 | | | | | | 2.2 | | 21.0 |
| 20b | 14.0 | | 2.5 | 1.4 | | | | -(2) | | | | 17.9 |
| 21a | 5.5 | | | 0.2 | | | | | | 0.3 | | 6.0 |
| 21b | 6.4 | | | 1.6 | | | | | | | | 8.0 |
| 22 | 19.7 | | | 1.0 | | | | | | | 0.5 | 21.2 |
| 23 | 11.1 | | | 0.2 | | | | 1.5(4) | | | 1.0 | 13.8 |
| 24a | 24.1 | | | 2.2 | | | | 1.0(2) | | | | 27.3 |
| 24b | 1.3 | 2.3 | 1.8 | 0.7 | | | | | | | | 6.1 |
| 25 | 11.7 | | | | | | | | | | | 11.7 |
| 26 | 0.6 | | | | | | | | | | | 0.6 |
| 27 | 12.2 | | | | | | | 1.0(1) | 0.2 | | | 13.4 |
| 28 | 2.8 | | | 0.4 | | | | | | | | 3.2 |

Table 6-6 (continued)
Vegetation Types Traversed by the Alternative Corridors

| Line No. | Miles Traversed by Corridors | | |

Table 4-6 (continued)
Vegetation Types Traversed by the Alternative Corridors

| Link No. | Miles Traversed by Corridors | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Vegetation Types[b] | | | | | | | | | | | |
| | CBS | | | | BS | | | | | | | |
| | CBS | CBS/SS | CBS/JTW | SS | BS | BS/JTW | JTW | DW | RW | Barren | Cropland | Total Miles |
| 29 | 0.6 | | | 1.5 | | | | | | | | 2.1 |
| 30 | 1.0 | | | | | | 1.1 | | | | | 2.1 |
| 31 | | 0.8 | 2.3 | | | | 2.6 | | | | | 5.7 |
| 32 | 14.5 | | 1.2 | | | | | 0.4(1) | 0.1 | | 0.2 | 16.4 |
| 33 | 10.2 | | 5.3 | | | | | | 0.2 | | | 15.7 |
| 34 | | | 1.0 | | | | | 0.4(1) | | | | 1.4 |
| 35 | | | 4.7 | | | | | | | | | 4.7 |
| 36 | | | 4.2 | 0.6 | | | 1.1 | | | | | 5.9 |
| 37 | 0.9 | 2.0 | 3.1 | 0.8 | | | 0.5 | | | | | 7.3 |
| 38 | 3.4 | 2.1 | | 4.2 | | | 0.6 | | | | | 10.3 |
| 39 | 3.2 | | | 2.5 | | | 0.5 | -(4) | | | | 6.2 |
| 40a | | | 3.9 | 2.3 | | | | | | | | 6.2 |
| 40b | | | 4.9 | | | | | | | | | 4.9 |
| 41 | 2.0 | | | 13.5 | | | | | | | | 15.5 |
| 42 | 12.7 | | | 9.2 | | | | | | | | 21.9 |
| 43 | 2.3 | | | 1.6 | | | | | | | | 3.9 |

Table 4-6 (continued)
Vegetation Types Traversed by the Alternative Corridors

| Link No. | Miles Traversed by Corridors | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Vegetation Types[b] | | | | | | | | | | | |
| | CBS | | | | BS | | | | | | | |
| | CBS | CBS/SS | CBS/JTW | SS | BS | BS/JTW | JTW | DW | RW | Barren | Cropland | Total Miles |
| 44 | 16.2 | | | | | | | | | | | 16.2 |
| 45 | 4.5 | | | 0.5 | | | | | | 0.7 | | 5.7 |

[a]Vegetation types along each link shown on Figure 4-2 (Map Volume).

[b]CBS = creosote bush scrub; SS = saltbush scrub; BS = blackbush scrub; JTW = Joshua tree woodland; DW = desert wash (number in parenthesis indicates number of washes traversed); RW = riparian woodland.

TABLE 4-7
DESERT TORTOISE HABITAT TRAVERSED BY THE ALTERNATIVE CORRIDORS[a]

| Link No. | Estimated Tortoise Density Class Traversed by Mileposts[b] | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Not Present | | | Low to Rare or Possibly Absent[c] | | | Low to Moderate | | | Moderate to High | | | Very High | | |
| | Begin | End | Length | Begin | End | Length | Begin | End | Length | Begin | End | Length | Begin | End | Length |
| 0 | | | | - | - | 13.5 | | | | | | | | | |
| 1 | 6.7 | 11.2 | 4.5 | - | - | 10.5 | 15.0 | 16.6 | 1.6 | | | | | | |
| 2 | | | | - | - | 2.0 | 0.0 | 4.5 | 4.5 | | | | | | |
| 3 | 4.2 | 8.4 | 4.2 | - | - | 2.2 | 0.0 | 2.0 | 2.0 | | | | | | |
| 4 | | | | - | - | 1.9 | | | | | | | | | |
| 5a | | | | - | - | 0.2 | | | | | | | | | |
| 5b | 3.5 | 4.8 | 1.3 | - | - | 3.5 | | | | | | | | | |
| 5c | 0.0 | 1.0 | 1.0 | | | | 1.0 | 6.5 | 5.5 | | | | | | |
| | 6.5 | 12.3 | 5.8 | | | | | | | | | | | | |
| 6 | 0.0 | 0.5 | 0.5 | - | - | 54.2 | 1.8 | 8.5 | 6.7 | | | | | | |
| | 1.4 | 1.8 | 0.4 | | | | 45.5 | 47.2 | 1.7 | | | | | | |
| | 8.5 | 18.0 | 9.5 | | | | | | | | | | | | |
| | 30.0 | 39.0 | 9.0 | | | | | | | | | | | | |
| | 47.2 | 48.5 | 1.3 | | | | | | | | | | | | |
| 7 | 0.0 | 4.0 | 4.0 | | | | 4.0 | 13.5 | 9.5 | | | | | | |
| 8 | 0.0 | 4.0 | 4.0 | | | | 4.0 | 12.9 | 8.9 | | | | | | |
| 9 | 0.0 | 6.5 | 6.5 | - | - | 5.0 | 11.5 | 25.0 | 13.5 | | | | | | |
| 10 | 0.0 | 12.0 | 12.0 | | | | 12.0 | 14.5 | 2.5 | 14.5 | 19.9 | 5.4 | | | |
| 11 | 1.7 | 3.7 | 2.0 | - | - | 16.7 | 0.0 | 0.7 | 0.7 | | | | | | |
| | 7.9 | 9.0 | 1.1 | | | | | | | | | | | | |

Table 4-7 (continued)
Desert Tortoise Habitat Traversed by the Alternative Corridors

| Link No. | Estimated Tortoise Density Class Traversed by Mileposts[b] | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Not Present | | | Low to Rare or Possibly Absent[c] | | | Low to Moderate | | | Moderate to High | | | Very High | | |
| | Begin | End | Length | Begin | End | Length | Begin | End | Length | Begin | End | Length | Begin | End | Length |
| 12 | 1.3 | 2.2 | 0.9 | - | - | 3.0 | 0.0 | 1.0 | 1.0 | | | | | | |
| 13 | | | | - | - | 10.6 | | | | | | | | | |
| 14 | | | | - | - | 4.9 | | | | | | | | | |
| 15 | 0.9 | 3.2 | 2.2 | - | - | 2.8 | | | | | | | | | |
| 16 | 0.3 | 3.5 | 3.2 | - | - | 5.4 | | | | | | | | | |
| 17 | 1.0 | 3.2 | 2.2 | - | - | 3.1 | | | | | | | | | |
| 18 | | | | - | - | 3.7 | | | | | | | | | |
| 19 | | | | - | - | 8.0 | | | | | | | | | |
| 20a | 8.8 | 11.0 | 2.2 | - | - | 19.8 | | | | | | | | | |
| 20b | | | | - | - | 11.4 | | | | 4.0<br>11.0 | 8.5<br>13.0 | 4.5<br>2.0 | | | |
| 21a | 4.2 | 6.0 | 1.8 | - | - | 4.2 | | | | | | | | | |
| 21b | 0.0 | 4.0 | 4.0 | - | - | 4.0 | | | | | | | | | |
| 22 | 13.5 | 14.0 | 0.5 | - | - | 20.7 | | | | | | | | | |
| 23 | 0.0<br>3.5 | 1.5<br>4.5 | 1.5<br>1.0 | - | - | 11.3 | | | | | | | | | |
| 24a | 17.8 | 21.0 | 3.2 | | | | 0.0<br>21.0 | 8.0<br>26.0 | 8.0<br>5.0 | 8.0<br>26.0 | 16.0<br>27.3 | 8.0<br>1.3 | 16.0 | 17.8 | 1.8 |
| 24b | | | | | | | | | | 0.0 | 6.1 | 6.1 | | | |

Table 4-7 (continued)
Desert Tortoise Habitat Traversed by the Alternative Corridors

| Link No. | Estimated Tortoise Density Class Traversed by Mileposts[b] | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Not Present | | | Low to Rare or Possibly Absent[c] | | | Low to Moderate | | | Moderate to High | | | Very High | | |
| | Begin | End | Length | Begin | End | Length | Begin | End | Length | Begin | End | Length | Begin | End | Length |
| 25 | | | | | | | 0.0 | 7.0 | 7.0 | 7.0 | 11.7 | 4.7 | | | |
| 26 | | | | - | - | 0.6 | | | | | | | | | |
| 27 | 12.0 | 13.4 | 1.4 | - | - | 1.5 | | | | 8.0 | 12.0 | 4.0 | 0.0 | 6.5 | 6.5 |
| 28 | 0.0 | 0.6 | 0.6 | | | | | | | 0.6 | 3.2 | 2.6 | | | |
| 29 | | | | | | | | | | 0.0 | 2.1 | 2.1 | | | |
| 30 | | | | | | | | | | 0.0 | 2.1 | 2.1 | | | |
| 31 | | | | | | | 0.0 | 5.7 | 5.7 | | | | | | |
| 32 | 14.5 | 15.2 | 0.7 | - | - | 8.1 | | | | 0.0 | 7.6 | 7.6 | | | |
| 33 | 14.6 | 14.8 | 0.2 | - | - | 7.3 | | | | 0.0 | 8.2 | 8.2 | | | |
| 34 | | | | - | - | 1.4 | | | | | | | | | |
| 35 | | | | - | - | 4.7 | | | | | | | | | |
| 36 | | | | | | | | | | 0.0 | 5.9 | 5.9 | | | |
| 37 | | | | | | | 0.0 | 5.0 | 5.0 | 5.0 | 7.3 | 2.3 | | | |
| 38 | | | | | | | 0.0 | 10.3 | 10.3 | | | | | | |
| 39 | | | | | | | | | | 0.0 | 6.2 | 6.2 | | | |
| 40a | | | | | | | | | | 0.0 | 6.2 | 6.2 | | | |
| 40b | | | | | | | | | | 0.0 | 4.9 | 4.9 | | | |
| 41 | | | | | | | 15.0 | 15.5 | 0.5 | 0.0 | 15.0 | 15.0 | | | |

Table 4-7 (continued)
Desert Tortoise Habitat Traversed by the Alternative Corridors

| Link No. | Estimated Tortoise Density Class Traversed by Mileposts[b] | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Not Present | | | Low to Rare or Possibly Absent[c] | | | Low to Moderate | | | Moderate to High | | | Very High | | |
| | Begin | End | Length | Begin | End | Length | Begin | End | Length | Begin | End | Length | Begin | End | Length |
| 42 | | | | | | | | | | 0.0 | 21.9 | 21.9 | | | |
| 43 | | | | | | | | | | 0.0 | 3.9 | 3.9 | | | |
| 44 | 0.0 | 16.2 | 16.2 | | | | | | | | | | | | |
| 45 | 4.5 | 5.7 | 1.2 | - | - | 4.5 | | | | | | | | | |

[a]Desert tortoise habitats traversed by the proposed corridors are shown on Figure 4-3; estimated density values shown on Table B-1.

[b]Estimated density classes (individuals per square mile): (1) Low to rare or possibly absent = 0 to 50;
(2) Low to moderate = 50 to 150;
(3) Moderate to high = 100 to 250; and
(4) Very high = greater than 250.

[c]Mileposts for this density class are not provided for sake of brevity; note that this class is the most frequently traversed.

TABLE 4-8
MOHAVE GROUND SQUIRREL HABITAT
TRAVERSED BY THE PROPOSED CORRIDORS[a]

| Link Number | Mileposts Begin | End | Length |
|---|---|---|---|
| 20a | 11.2 | 21.0 | 9.8 |
| 20b | 0.0 | 17.9 | 17.9 |
| 24a | 21.0 | 27.3 | 6.3 |
| 24b | 0.0 | 6.1 | 6.1 |
| 28 | 0.6 | 3.2 | 2.6 |
| 29 | 0.0 | 2.1 | 2.1 |
| 30 | 0.0 | 2.1 | 2.1 |
| 31 | 0.0 | 5.7 | 5.7 |
| 32 | 0.0 | 14.5 | 14.5 |
| | 15.2 | 16.4 | 1.2 |
| 33 | 0.0 | 14.6 | 14.6 |
| | 14.8 | 15.7 | 0.9 |
| 34 | 0.0 | 1.4 | 1.4 |
| 35 | 0.0 | 4.7 | 4.7 |
| 36 | 0.0 | 5.9 | 5.9 |
| 37 | 0.0 | 7.3 | 7.3 |
| 38 | 0.0 | 10.3 | 10.3 |
| 39 | 0.0 | 6.2 | 6.2 |
| 40a | 0.0 | 6.2 | 6.2 |
| 40b | 0.0 | 4.9 | 4.9 |
| 41 | 0.0 | 15.5 | 15.5 |
| 42 | 0.0 | 21.9 | 21.9 |
| 43 | 0.0 | 3.9 | 3.9 |

[a]Mohave ground squirrel habitat traversed by the alternative corridors shown on Figure 4-3.

TABLE E-5
MOHAVE GROUND SQUIRREL HABITAT
TRAVERSED BY THE PROPOSED CRAMER[a]

| Link Number | Mainposts Begin | Mainposts End | Length |
|---|---|---|---|
| 20a | 14.2 | 21.0 | 6.8 |
| 20b | 0.0 | 17.9 | 17.9 |
| 24a | 21.0 | 27.3 | 6.3 |
| 24b | 0.0 | 0.1 | 0.1 |
| 28 | 0.4 | 3.2 | 2.8 |
| 29 | 0.0 | 2.1 | 2.1 |
| 30 | 0.0 | 2.1 | 2.1 |
| 31 | 0.0 | 5.7 | 5.7 |
| 32 | 0.0 | 14.5 | 14.5 |
| | 15.1 | 16.4 | 1.3 |
| 33 | 0.0 | 10.8 | 10.8 |
| | 14.7 | 15.7 | 0.9 |
| 34 | 0.0 | 1.6 | 1.6 |
| 35 | 0.0 | 6.7 | 6.7 |
| 36 | 0.0 | 5.9 | 5.9 |
| 37 | 0.0 | 7.3 | 7.3 |
| 38 | 0.0 | 10.3 | 10.3 |
| 39 | 0.0 | 5.2 | 5.2 |
| 40a | 0.0 | 6.2 | 6.2 |
| 40b | 0.0 | 6.7 | 6.7 |
| 41 | 8.0 | 15.3 | 7.3 |
| 42 | 0.0 | 21.4 | 21.4 |
| 43 | 0.0 | 3.9 | 3.9 |

[a]Mohave ground squirrel habitat traversed by the alternative corridors shown on Figure 6-3.

# TABLE 4-9
# POTENTIAL HABITAT OF SPECIAL INTEREST PLANT SPECIES TRAVERSED BY THE ALTERNATIVE CORRIDORS[a]

## Potential Habitat Traversed by Milepost

| Link No. | Jaeger's Milkvetch | | | Mojave Spineflower | | | Desert Cymopterus | | | Barstow Woolly Sunflower | | | Bicolored Penstemon | | | Nelson's Phacelia | | | Mojave Fishhook Cactus | | | Rusby's Desert Mallow | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Begin | End | Length | Begin | End | Length | Begin | End | Length | Begin | End | Length | Begin | End | Length | Begin | End | Length | Begin | End | Length | Begin | End | Length |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| 5c | | | | | | | | | | | | | 5.2 | 11.2 | 6.0 | 5.2 | 11.2 | 6.0 | | | | | | |
| 6 | | | | | | | | | | | | | | | | 6.5 | 12.3 | 5.8 | | | | 6.5 | 12.3 | 5.8 |
| 7 | | | | | | | | | | | | | | | | 8.5 | 14.0 | 5.5 | | | | 8.5 | 14.0 | 5.5 |
| 8 | | | | | | | | | | | | | | | | 0.0 | 4.6 | 4.6 | | | | 0.0 | 4.6 | 4.6 |
| 20a | 18.5 | 21.0 | 2.5 | | | | | | | | | | | | | 0.0 | 4.0 | 4.0 | | | | 0.0 | 4.0 | 4.0 |
| 20b | 0.0 | 11.0 | 11.0 | 11.0 | 17.9 | 6.9 | | | | | | | | | | | | | 18.5 | 21.0 | 2.5 | | | |
| 21b | | | | | | | | | | | | | | | | | | | 0.0 | 11.0 | 11.0 | | | |
| 22 | | | | | | | | | | 4.0 | 8.0 | 4.0 | | | | | | | | | | | | |
| 23 | | | | | | | | | | 16.0 | 21.2 | 5.2 | | | | | | | | | | | | |
| 24a | | | | | | | | | | 1.5 | 3.5 | 2.0 | | | | | | | 1.5 | 3.5 | 2.0 | | | |
| | | | | 8.0 | 17.8 | 9.8 | | | | 4.5 | 8.5 | 4.0 | | | | | | | 4.5 | 13.8 | 9.3 | | | |
| | | | | 21.0 | 27.3 | 6.3 | 21.0 | 27.3 | 6.3 | | | | | | | | | | 0.0 | 17.8 | 17.8 | | | |
| 24b | | | | 0.0 | 6.1 | 6.1 | 0.0 | 6.1 | 6.1 | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | | | | | | | 0.0 | 11.7 | 11.7 | | | |
| 27 | | | | 0.0 | 12.0 | 12.0 | | | | | | | | | | | | | 0.0 | 0.6 | 0.6 | | | |
| 28 | | | | 0.6 | 3.2 | 2.6 | 0.6 | 3.2 | 2.6 | | | | | | | | | | 5.5 | 12.0 | 6.5 | | | |
| 29 | | | | 0.0 | 2.1 | 2.1 | 0.0 | 2.1 | 2.1 | | | | | | | | | | | | | | | |
| 30 | | | | 0.0 | 2.1 | 2.1 | 0.0 | 2.1 | 2.1 | | | | | | | | | | | | | | | |
| 31 | | | | 0.0 | 5.7 | 5.7 | 0.0 | 5.7 | 5.7 | | | | | | | | | | | | | | | |
| 32 | | | | 0.0 | 14.5 | 14.5 | | | | | | | | | | | | | | | | | | |
| | | | | 15.2 | 16.4 | 1.2 | | | | | | | | | | | | | 0.0 | 14.5 | 14.5 | | | |
| 33 | | | | 0.0 | 14.6 | 14.6 | | | | | | | | | | | | | 15.2 | 16.4 | 1.2 | | | |
| | | | | 14.8 | 15.7 | 0.9 | | | | | | | | | | | | | 0.0 | 14.6 | 14.6 | | | |
| 34 | | | | 0.0 | 1.0 | 1.0 | | | | | | | | | | | | | 14.8 | 15.7 | 0.9 | | | |
| 35 | | | | 0.0 | 4.7 | 4.7 | 0.0 | 4.7 | 4.7 | | | | | | | | | | 0.0 | 1.0 | 1.0 | | | |
| 36 | | | | 0.0 | 5.9 | 5.9 | 0.0 | 5.9 | 5.9 | | | | | | | | | | | | | | | |
| 37 | | | | 0.0 | 7.3 | 7.3 | 0.0 | 7.3 | 7.3 | 0.0 | 7.3 | 7.3 | | | | | | | | | | | | |
| 38 | | | | 0.0 | 10.3 | 10.3 | 0.0 | 10.3 | 10.3 | 0.0 | 10.3 | 10.3 | | | | | | | | | | | | |
| 39 | | | | 0.0 | 6.2 | 6.2 | 0.0 | 6.2 | 6.2 | 0.0 | 6.2 | 6.2 | | | | | | | | | | | | |
| 40a | | | | 0.0 | 6.2 | 6.2 | 0.0 | 6.2 | 6.2 | | | | | | | | | | | | | | | |
| 40b | | | | 0.0 | 4.9 | 4.9 | 0.0 | 4.9 | 4.9 | | | | | | | | | | | | | | | |
| 41 | | | | 0.0 | 15.5 | 15.5 | 0.0 | 15.5 | 15.5 | 0.0 | 15.5 | 15.5 | | | | | | | | | | | | |
| 42 | | | | 0.0 | 21.9 | 21.9 | 0.0 | 21.9 | 21.9 | 0.0 | 21.9 | 21.9 | | | | | | | | | | | | |
| 43 | | | | 0.0 | 3.9 | 3.9 | 0.0 | 3.9 | 3.9 | | | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | | | | | | | 12.5 | 16.2 | 3.7 | | | |

[a]Potential habitat within proposed corridors for species listed above is shown on Figure 4-3; scientific names for species and regional distribution provided in Table 4-5.

## TABLE 4-10
## POTENTIAL AND KNOWN GOLDEN EAGLE NESTING HABITAT NEAR THE ALTERNATIVE CORRIDORS[a]

| Link No. | Mileposts Begin | Mileposts End | Length (Miles) | Golden Eagle Nesting Habitat |
|---|---|---|---|---|
| 0 | 8.0 | 9.9 | 1.9 | 3 miles northwest of potential nesting habitat on Eldorado Mountain |
| 1 | 5.2 | 11.2 | 6.0 | Adjacent to potential nesting habitat in the McCullough Mountains |
| 5c | 6.5 | 12.3 | 5.8 | 2 to 3 miles southeast of known nest sites on Clark Mountain |
| 6 | 1.8 | 8.5 | 6.7 | 2 to 4 miles south of potential nesting habitat in the Clark Mountain Range |
| | 8.5 | 18.0 | 9.5 | Adjacent to known nesting habitat on Clark Mountain |
| | 54.0 | 56.0 | 2.0 | Adjacent to and north of potential nesting habitat in the Soda Mountains |
| | 56.0 | 60.0 | 4.0 | Adjacent to potential nesting habitat in the Avawatz Mountains |
| | 64.0 | 83.3 | 19.3 | Adjacent to potential nesting habitat in Alvord and Soda mountains |
| 7 | 0.0 | 2.7 | 2.7 | 2 miles south of known nest sites on Clark Mountain |
| 8 | 0.0 | 2.6 | 2.6 | 2 miles south of known nest sites on Clark Mountain |
| 20a | 0.0 | 4.8 | 4.8 | 3 miles south of potential nesting habitat on Alvord Mountain |
| | 19.0 | 21.0 | 2.0 | Adjacent to known nesting habitat in the Lane and Calico mountains |
| 20b | 0.0 | 2.0 | 2.0 | Adjacent to known nesting habitat in the Lane and Calico mountains |
| 21a | 0.0 | 1.0 | 1.0 | 2 to 3 miles south of potential nesting habitat on Alvord Mountain |

TABLE A-10
POTENTIAL AND KNOWN GOLDEN EAGLE NESTING HABITAT
NEAR THE ALTERNATIVE CORRIDORS*

| Link No. | Milepost Begin | Milepost End | Length (miles) | Golden Eagle Nesting Habitat |
|---|---|---|---|---|
| 0 | 8.0 | 9.2 | 1.5 | 3 miles northwest of potential nesting habitat on Eldorado Mountain |
| 1 | 5.2 | 11.2 | 6.0 | Adjacent to potential nesting habitat in the Mountaugh Mountains |
| 5c | 6.5 | 12.3 | 7.5 | 2 to 3 miles northeast of known nest sites on Clark Mountain |
| 6 | 1.0 | 8.5 | 6.7 | 2 to 4 miles south of potential nesting habitat in the Clark Mountain range |
| | 8.5 | 15.0 | 9.5 | Adjacent to known nesting habitat on Clark Mountain |
| | 54.0 | 56.0 | 2.0 | Adjacent to and north of potential nesting habitat in the Clark Mountains |
| | 56.0 | 60.0 | 4.0 | Adjacent to potential nesting habitat in the Avawatz Mountains |
| | 66.0 | 82.5 | 12.3 | Adjacent to potential nesting habitat in Mt. Pinto and Sheep Mountains |
| 7 | 0.0 | 2.7 | 2.7 | 2 miles south of known nest sites on Clark Mountain |
| 8 | 0.0 | 2.5 | 2.5 | 2 miles south of known nest sites on Clark Mountain |
| 20a | 0.0 | 6.6 | 4.8 | 3 miles south of potential nesting habitat on Alverd Mountain |
| | 19.0 | 21.0 | 2.0 | Adjacent to known nesting habitat in the Lane and Cottonwood mountains |
| 20c | 0.0 | 2.0 | 2.0 | Adjacent to known nesting habitat in the Lane and Cottonwood mountains |
| 21a | 0.0 | 1.0 | 1.0 | 1 to 2 miles south of potential nesting habitat on Alverd Mountains |

Table 4-10 (continued)
Potential and Known Golden Eagle Nesting Habitat

| Link No. | Mileposts Begin | Mileposts End | Length (Miles) | Golden Eagle Nesting Habitat |
|---|---|---|---|---|
| 21b | 8.0 | 8.0 | 0.0 | 2 miles south of potential nesting habitat in the Calico Mountains |
| 22 | 21.2 | 21.2 | 0.0 | 2 miles south of potential nesting habitat in the Calico Mountains |
| 23 | 0.0 | 0.0 | 0.0 | 2 miles south of potential nesting habitat in the Calico Mountains |
| | 4.5 | 8.5 | 4.0 | 4 to 5 miles north of known nesting habitat in the Newberry Mountains |
| 25 | 7.0 | 11.7 | 4.7 | 2 to 3 miles north of potential nesting habitat on Stoddard Ridge |
| 32 | 9.8 | 14.5 | 4.7 | 0.7 mile south of potential nesting habitat on Quartzite Mountain |
| 33 | 10.2 | 14.6 | 4.4 | 1 mile south of potential nesting habitat on Quartzite Mountain |
| 44 | 12.5 | 16.2 | 3.7 | Adjacent to known nesting habitat in the Lane and Calico mountains |

[a]Known or potential golden eagle nesting habitat within or adjacent to the alternative corridors shown on Figure 4-3.

Table 6-10 (continued)
Potential and Known Golden Eagle Nesting Habitat

| Link No. | Milepost Begin | Milepost End | Length (Miles) | Golden Eagle Habitat Location |
|---|---|---|---|---|
| 21b | 8.0 | 8.0 | 0.0 | 2 miles south of potential nesting habitat in the Collins Mountains |
| 22 | 21.2 | 21.2 | 0.0 | 2 miles south of potential nesting habitat in the Collins Mountains |
| 23 | 0.0 | 0.0 | 0.0 | 2 miles south of potential nesting habitat in the Collins Mountains |
| | 4.5 | 8.5 | 4.0 | 4 to 5 miles north of known nesting habitat in the McCoy Mountains |
| 25 | 7.0 | 11.7 | 4.7 | 2 to 3 miles north of potential nesting habitat in Stoddard Ridge |
| 32 | 9.8 | 14.5 | 4.7 | 0.7 mile south of potential nesting habitat on Quartzite Mountain |
| 33 | 10.2 | 14.4 | 4.4 | 1 mile south of potential nesting habitat on Quartzite Mountain |
| 9a | 12.5 | 16.2 | 3.7 | Adjacent to known nesting habitat in the Lone and Collins Mountains |

*Known or potential golden eagle nesting habitat within or adjacent to the alternative corridors shown on Figure 6-3.

TABLE 4-11
DESERT BIGHORN SHEEP HABITAT TRAVERSED BY THE ALTERNATIVE CORRIDORS[a]

| Link No. | Mileposts Begin | Mileposts End | Length (Miles) | Description |
|---|---|---|---|---|
| 1 | 6.7 | 11.2 | 4.5 | Corridor traverses McCullough Mountains where a permanent bighorn sheep population is located mostly in south McCullough Mountains, south of the pass. |
| | 16.0 | 16.5 | 0.5 | Corridor 0.25 mile south of Sheep Mountains, a transient habitat for bighorn sheep which is probably utilized very infrequently. |
| 2 | 1.5 | 3.0 | 1.5 | Corridor 0.25 mile north of Roach Mountains, a transient habitat for bighorn sheep which is probably utilized very infrequently. |
| 5c | 10.0 | 11.0 | 1.0 | Corridor 0.5 mile south of higher slopes of Clark Mountain which supports a permanent bighorn sheep population. |
| | 11.0 | 11.9 | 0.9 | Corridor traverses higher slopes of Clark Mountain (north of Mohawk Hill), which supports a permanent bighorn sheep population. |
| 6 | 1.4 | 1.8 | 0.4 | Corridor traverses lower slopes of Spring Mountains, a transient habitat for bighorn sheep which is probably utilized very infrequently. |
| | 10.0 | 13.0 | 3.0 | Corridor traverses higher slopes of Clark Mountains, which supports a permanent bighorn sheep population. |
| | 53.0 | 60.0 | 7.0 | Corridor passes through potential lowland movement corridor between Avawatz Mountains, 5 to 8 miles to the north which supports a permanent bighorn sheep population, and Soda Mountains, a transient sheep habitat which is probably utilized very infrequently. |
| 7 | 0.0 | 1.0 | 1.0 | Corridor traverses higher slopes of Clark Mountain (north of Mohawk Hill), which supports a permanent bighorn sheep population. |

Table 4-11 (continued)
Desert Bighorn Sheep Habitat Traversed

| Link No. | Mileposts Begin | Mileposts End | Length (Miles) | Description |
|---|---|---|---|---|
| 7 (cont.) | 1.0 | 2.7 | 1.7 | Corridor 0.25 mile south of higher slopes of Clark Mountain (north of Mohawk Hill), which supports a permanent population of bighorn sheep. |
| 8 | 0.0 | 0.6 | 0.6 | Corridor traverses higher slopes of Clark Mountain (north of Mohawk Hill), which supports a permanent bighorn sheep population. |
| | 0.6 | 2.6 | 2.0 | Corridor 0.25 to 0.50 mile south of higher slopes of Clark Mountain (north of Mohawk Hill), which supports a permanent population of bighorn sheep. |
| 11 | 8.0 | 9.0 | 1.0 | Corridor traverses isolated hill within Soda Mountains, which is a transient habitat for bighorn sheep and is probably utilized infrequently. |
| 15 | 0.9 | 3.2 | 2.3 | Corridor traverses higher slopes of Cave Mountain (2 miles north of Afton Canyon), which probably provides habitat for permanent bighorn sheep population in Cady Mountains, 2 miles to the south. |
| 17 | 1.0 | 3.2 | 2.2 | Corridor traverses higher slopes of Cave Mountain (1 to 2 miles north of Afton Canyon), which probably provides habitat for permanent bighorn sheep population in Cady Mountains, 2 miles to the south. |

[a]Bighorn sheep habitat traversed by, or near to, the alternative corridors shown on Figure 4-3.

Table A-11 (continued)
Desert Bighorn Sheep Habitat Traversed

| Link No. | Milepoints Begin | Milepoints End | Length (Miles) | Description |
|---|---|---|---|---|
| 7 (cont.) | 1.0 | 2.7 | 1.7 | Over the 0.35 mile south of higher slopes of Black Mountain (north of Mohawk Hill), which crosses a permanent equipment of alfalfa [illegible]. |
| 8 | 0.0 | 0.4 | 0.4 | Crestline traverses higher slopes of Black Mountain (north of Mohawk Hill), which supports desert bighorn sheep possibilities. |
| | 0.4 | 2.4 | 2.0 | Crestline 0.25 to 0.50 mile south of higher slopes of Black Mountain (north of Mohawk Hill) which supports permanent equipment of alfalfa [illegible]. |
| 11 | 8.0 | 9.0 | 1.0 | Crestline traverses Sentinel Hill within Sale Mountains, which is a primary habitat for bighorn sheep and is moderately utilized actively. |
| 15 | 0.9 | 3.7 | 2.8 | Crestline traverses higher slopes of Cane Mountain (2 miles west of Allen Canyon), which probably involves [illegible] bighorn sheep population in Cane Mountains [illegible] sheep. |
| 17 | 1.0 | 3.2 | 2.2 | Crestline traverses higher slopes of Cane Mountain (1 to 2 miles north of Allen Canyon), which probably involves [illegible] bighorn sheep population in Cane Mountains, 2 miles to the south. |

*Bighorn sheep habitat traversed by, or near to, the alternative corridors shown on Figure 4-3.

## TABLE 4-12
## SENSITIVITY OF BIOLOGICAL RESOURCES POTENTIALLY AFFECTED BY THE PROPOSED PROJECT

A. MAXIMUM SENSITIVITY

1. Riparian woodland vegetation and wildlife habitat.
2. Potential desert tortoise habitat (very high density: more than 250 individuals per square mile).
3. Three or more co-occurring high sensitivity resources (see below).

B. MAJOR SENSITIVITY

1. Desert wash vegetation and wildlife habitat.
2. Potential desert tortoise habitat (moderate to high density: 100 to 250 individuals per square mile).
3. Potential habitat for three or more special-interest plant species.
4. Known nesting habitat for the golden eagle and/or prairie falcon.
5. Known permanent range of desert bighorn sheep.
6. Three or more co-occurring moderate sensitivity resources (see below).

C. MODERATE SENSITIVITY

1. Joshua tree woodland vegetation and wildlife habitat.
2. Within or adjacent to potential Gila monster habitat.
3. Potential desert tortoise habitat (low to moderate density: 50 to 150 individuals per square mile).
4. Potential likely nesting habitat for the Swainson's hawk, yellow-billed cuckoo, and least bell's vireo.[a]

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[a]Potential habitat for these riparian-nesting species occurs along the Mojave River, although no specific location can be identified. The sensitivity of these resources is accounted for in riparian woodlands (maximum sensitivity category) during the impact assessment process.

## TABLE A-12
## SENSITIVITY OF BIOLOGICAL RESOURCES POTENTIALLY AFFECTED BY THE PROPOSED PROJECT[1]

### A. MAXIMUM SENSITIVITY

1. Riparian woodland vegetation and wildlife habitat.

2. Potential desert tortoise habitat (very high density, more than 250 individuals per square mile).

3. Three or more co-occurring high sensitivity resources (see below).

### B. MAJOR SENSITIVITY

1. Desert wash vegetation and wildlife habitat.

2. Potential desert tortoise habitat (moderate to high density, 100 to 250 individuals per square mile).

3. Potential habitat for three or more sensitive plant species.

4. Known nesting habitat for the golden eagle and/or prairie falcon.

5. Known permanent camp at least 5 miles away.

6. Three or more co-occurring moderate sensitivity resources (see below).

### C. MODERATE SENSITIVITY

1. Indian rice woodland vegetation and wildlife habitat.

2. Within or adjacent to Joshua Tree National Monument.

3. Potential desert tortoise habitat (low to moderate density, 30 to 100 individuals per square mile).

4. Potential nesting habitat for the Swainson's hawk, or other allied species (not specifically known).

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[1] Potential habitat for these conservation-minded species occurs along the Mojave River, although no specific location can be identified. The sensitivity of these resources is recognized for in-stream and adjacent (riparian and wetlands) corridors during the project development process.

Table 4-12 (continued)
Sensitivity of Biological Resources

C. MODERATE SENSITIVITY (continued)

5. Potential Mohave ground squirrel habitat.

6. Potential habitat for one or two special-interest plant species.

7. Within potential, or adjacent to known, nesting habitat for the golden eagle and/or prairie falcon.

8. Adjacent to permanent range of desert bighorn sheep.

9. Four or more co-occurring low sensitivity resources.

D. MINIMAL SENSITIVITY

1. Scrub vegetation and wildlife habitat (creosote bush, saltbush, and blackbush scrub), as well as barren areas, croplands, and built-up areas.

2. Potential desert tortoise habitat (low density: 0 to 50 individuals per square mile).

3. Adjacent to potential nesting habitat for the golden eagle and prairie falcon.

4. Within or adjacent to transient desert bighorn sheep habitat or movement corridor.

TABLE 4-13
IMPACT LEVEL MODEL[a]

| Access Level | Resource Sensitivity | | | |
|---|---|---|---|---|
| | Minimal | Moderate | Major | Maximum |
| Sufficient | L | L | M | M/H |
| Upgraded | L | M | M/H | H |
| New | M | M/H | H | H+ |

[a]Impact levels represent a composite rating of impact magnitude and significance based on access requirements and resource sensitivity where L = low, M = moderate, and H = high Access requirements and resource sensitivity levels are described in text. Generic mitigation measures have been taken into account in the assignment of impact levels in the model.

TABLE 4-14
MATRIX OF RECOMMENDED SELECTIVE MITIGATION MEASURES AND AFFECTED RESOURCES[a]

| Resource Sensitivity[b] | No Required Mitigation | Recommended Selective Mitigation Measures[c] | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 4 | 8 | 11 | 13 |
| A. MAXIMUM SENSITIVITY | | | | | | | |
| 1. Riparian woodland/habitat | | X | X | | X | | |
| 2. Desert tortoise habitat (H density) | | X | X | X | | X | X |
| B. MAJOR SENSITIVITY | | | | | | | |
| 1. Desert wash vegetation/habitat | | X | X | | X | | |
| 2. Desert tortoise habitat (M-H density) | | X | | | | X | X |
| 3. 3 or more special-interest plants | | X | | | | | X |
| 4. Raptor nesting habitat | X | | | | | | |
| 5. Bighorn sheep permanent range | | X | | X | | X | |
| C. MODERATE SENSITIVITY | | | | | | | |
| 1. Joshua tree woodland/habitat | | X | | | | | |
| 2. Gila monster habitat | | X | | | | | |
| 3. Desert tortoise habitat (L-M density) | | X | | | | | |
| 4. Riparian bird nesting habitat | | X | X | | X | | |
| 5. Mohave ground squirrel habitat | | X | | | | | |
| 6. 1 or 2 special-interest plant(s) | | X | | | | | X |
| 7. Near raptor nesting habitat | X | | | | | | |
| 8. Near bighorn sheep permanent range | X | | | | | | |

[a]This matrix indicates which recommended selective mitigation measures are applicable to affected resources and would result in reduced impact levels.

[b]Only moderate to maximum sensitivity resources potentially affected by the proposed project are listed.

[c]These measures are described in the text.

TABLE 4-14

MATRIX OF RECOMMENDED SELECTIVE MITIGATION MEASURES AND AFFECTED RESOURCES[a]

| Resource Sensitivity[b] | No Required Mitigation | Recommended Selective Mitigation Measures[c] 1 | 2 | 4 | 8 | 11 | 13 |
|---|---|---|---|---|---|---|---|
| A. MAXIMUM SENSITIVITY | | | | | | | |
| 1. Storm surge/beach habitat | | X | X | | X | | |
| 2. Desert tortoise habitat (H-density) | | X | X | X | | X | X |
| B. MAJOR SENSITIVITY | | | | | | | |
| 1. Desert sand vegetation habitat | | X | X | | X | | |
| 2. Desert tortoise habitat (M-H density) | | X | | | | X | X |
| 3. Two more special-interest plants | | X | | | | | X |
| 4. Raptor nesting habitat | X | | | | | | |
| 5. Tortoise sand permanent cover | | X | | X | | X | |
| C. MODERATE SENSITIVITY | | | | | | | |
| 1. Sand tree woodland habitat | | X | | | | | |
| 2. Tule marsh habitat | | X | | | | | |
| 3. Desert tortoise habitat (L-M density) | | X | | | | | |
| 4. Raptor foraging habitat | | X | | | X | | |
| 5. Native grassland habitat | | X | | | | | |
| 6. 1 or 2 special-interest plant(s) | | X | | | | | X |
| 7. Raptor nesting habitat | X | | | | | | |
| 8. Tortoise sand permanent cover | X | | | | | | |

[a]This matrix indicates which recommended selective mitigation measures are applicable to affected resources and avoid result in reduced impact levels.

[b]Only moderate to maximum sensitivity resources potentially affected by the proposed project are listed.

[c]These measures are described in the text.

TABLE 4-15
CHANGES IN IMPACT LEVEL DUE TO
APPLICATION OF RECOMMENDED SELECTIVE MITIGATION MEASURES

| Initial Impact Level | Application of Mitigation Measures | Residual Impact Level |
|---|---|---|
| Low (0.5, 1.0) | No mitigation applied if all resources affected have low sensitivities | Low (0.5, 1.0) |
| Low (0.5, 1.0) | 1 or 2 mitigation measures applied when one or more of the affected resources has a moderate sensitivity | Negligible/Low (0.0, 0.1) |
| Moderate (7) | 1 or 2 mitigation measures applied | Low (0.5, 1.0) |
| Moderate (7) | 3 or 4 mitigation measures applied | Negligible/Low (0.0, 0.1) |
| Moderate (9) | 1 mitigation measure applied | Moderate (7) |
| Moderate (9) | 2 to 3 mitigation measures applied | Low (0.1, 0.5, 1.0) |
| High (13) | 1 or 2 mitigation measures applied | Moderate (7, 9) |
| High (13) | 3 mitigation measures applied | Low (1.0) |
| High (15) | 4 mitigation measures applied | Moderate (7) |

This represents only the combinations of mitigation measures applied in IA/MP charts. Numeric ratings for the impact levels are shown in parentheses.

TABLE 4-15
CHANGES IN IMPACT LEVEL (CIE) DUE
APPLICATION OF RECOMMENDED SELECTIVE MITIGATION MEASURES

| Initial Impact Level | Application of Mitigation Measures | Residual Impact Level |
|---|---|---|
| Low (0.5, 1.0) | No mitigation applied if initial impacts affected have low sensitivities | Low (0.5, 1.0) |
| Low (0.5, 1.0) | 1 or 2 mitigation measures applied when one or more of the affected resources has a higher sensitivity | Moderate/Low (0.0, 1.1) |
| Moderate (7) | 1 or 2 mitigation measures applied | Low (0.5, 1.0) |
| Moderate (7) | 3 or 4 mitigation measures applied | Moderate/Low (0.0, 1.1) |
| Moderate (9) | 1 mitigation measure applied | Moderate (7) |
| Moderate (9) | 2 to 3 mitigation measures applied | Low (0.1, 0.5, 1.0) |
| High (13) | 1 or 2 mitigation measures applied | Moderate (7, 9) |
| High (13) | 3 mitigation measures applied | Low (1.0) |
| High (15) | 4 mitigation measures applied | Moderate (7) |

This represents only the sound locations of mitigation measures applied in IMPACT charts. Numerical ratings for the impact levels are shown in parentheses.

TABLE 4-16
IMPACT ASSESSMENT/MITIGATION PLANNING CHART
BIOLOGICAL RESOURCES

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 13.5 | 0.0 | 3.0 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 3.0 | 3.1 | 1,2,4 | S | M (7) | - | Desert wash; potential GM habitat | 2,8 | L (.5) | - | - |
| | | 3.1 | 13.5 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| 1 | 16.6 | 0.0 | 5.2 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 5.2 | 6.7 | 1-4 | S | M (7) | - | Potential GM habitat, potential habitat for 2 special-interest plants (McCullough Mountains) | 2,13a | L (.5) | - | - |
| | | 6.7 | 11.2 | 1-4 | S | M (7) | - | Bighorn sheep habitat; potential habitat for 2 special-interest plants (McCullough Mountains) | 2,11a, 13a | L (.1) | - | - |
| | | 11.2 | 16.6 | 1,2,4 | S | L (.5) | - | Potential DT habitat (low to moderate density) | 2 | L (.1) | - | - |
| 2 | 6.5 | 0.0 | 2.0 | 1,2,4 | S | L (.5) | - | Potential DT habitat (low to moderate density) | 2 | L (.1) | - | - |
| | | 2.0 | 6.5 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |

TABLE 4-16
IMPACT ASSESSMENT/MITIGATION PLANNING CHART
BIOLOGICAL RESOURCES

| Link Identifier | Length | Milepoints Begin | Milepoints End | Impact Type[a] | Access Level | Initial Impact Level | Sig-nifi-cant? | Resource Affected | Recom-mended Miti-gation | Residual Impact Level | Sig-nifi-cant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 13.3 | 0.0 | 3.0 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 3.0 | 3.1 | 1,2,4 | S | M (1) | - | Chemo-acetylcholinesterase (ChA) inhibitor | 2,3 | L (.5) | - | - |
| | | 3.1 | 13.3 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| 1 | 16.6 | 0.0 | 5.2 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 5.2 | 6.7 | 1-4 | S | M (1) | - | Potential ChA inhibitor, potential habitat for 2 special-interest plants (McCullough Mountains) | 2,1[b] | L (.5) | - | - |
| | | 6.7 | 11.2 | 1-4 | S | M (1) | - | Bighorn sheep habitat; potential habitat for 2 special-interest plants (McCullough Mountains) | 2,1[b], 1[a] | L (.1) | - | - |
| | | 11.2 | 16.6 | 1,2,4 | S | L (.5) | - | Potential DT habitat (low to moderate density) | 2 | L (.1) | - | - |
| 2 | 6.5 | 0.0 | 2.0 | 1,2,4 | S | L (.5) | - | Potential DT habitat (low to moderate density) | 2 | L (.1) | - | - |
| | | 2.0 | 6.5 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 8.4 | 0.0 | 2.0 | 1,2,4 | S | L (.5) | - | Potential DT habitat (low to moderate density) | 2 | L (.1) | - | - |
| | | 2.0 | 8.4 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| 4 | 1.9 | 0.0 | 1.9 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| 5a | 0.2 | 0.0 | 0.2 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| 5b | 4.8 | 0.0 | 3.5 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 3.5 | 4.0 | 1,2 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 4.0 | 4.8 | - | S | L (.5) | - | - | - | L (.5) | - | - |
| 5c | 12.3 | 0.0 | 1.0 | - | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 1.0 | 6.5 | 1,2,4 | S | L (.5) | - | Potential DT habitat (low to moderate density) | 2 | L (.1) | - | - |
| | | 6.5 | 7.3 | 1-4 | S | M (7) | - | Potential GM habitat; potential habitat for 2 special-interest plants; adjacent to known GE/PF nesting habitat (Clark Mountain) | 2,13a | L (.5) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Widths Down | Widths Left | Widths Right | Access Level | Initial Impact Level[a] | Sig-nifi-cant? | Resource Affected[b] | Recom-mended Miti-gation | Residual Impact Level | Sig-nifi-cant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 8.4 | 0.0 | 2.0 | 1,2,4 | 5 | L (3) | - | Potential DT habitat (low to moderate density) | 2 | L (1) | - | - |
| | | 2.0 | 8.4 | 1,2,4 | 5 | L (3) | - | | - | L (3) | - | - |
| 4 | 1.7 | 0.0 | 1.7 | 1,2,4 | 5 | L (3) | - | | - | L (3) | - | - |
| 5a | 0.2 | 0.0 | 0.2 | 1,2,4 | 5 | L (3) | - | | - | L (3) | - | - |
| 5b | 4.8 | 0.0 | 3.5 | 1,2,4 | 5 | L (3) | - | | - | L (3) | - | - |
| | | 3.5 | 4.8 | 1,2 | 5 | L (3) | - | | - | L (3) | - | - |
| | | 4.8 | 3.5 | 1,2 | 5 | L (3) | - | | - | L (3) | - | - |
| 5c | 12.2 | 0.0 | 1.0 | - | 5 | L (3) | - | | - | L (3) | - | - |
| | | 1.0 | 6.5 | 1,2,4 | 5 | L (3) | | Potential DT habitat (low to moderate density) | 2 | L (1) | - | - |
| | | 6.5 | 1.1 | 1,4 | 5 | M (1) | - | Potential GS habitat, potential T&E species, not plants subject to review (e.g. DT, nesting habitat (Black Rail)) | 2,1b | L (1) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5c (cont.) | | 7.3 | 9.0 | 1-4 | N | H (15) | Yes | Potential GM habitat; potential habitat for 2 special-interest plants; adjacent to known GE/PF nesting habitat (Clark Mountain) | 8,13a | M (7) | - | - |
| | | 9.0 | 12.3 | 1-4 | S | M (7) | - | Potential GM habitat; potential habitat for 2 special-interest plants; adjacent to known GE/PF nesting habitat; within and adjacent to BS habitat | 2,11a, 13a,8 | N (0) | - | - |
| 6 | 83.3 | 0.0 | 0.5 | 1,2 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 0.5 | 1.8 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 1.8 | 8.5 | 1,2,4 | S | L (.5) | - | Potential DT habitat (low to moderate density); adjacent to known GE/PF nesting habitat (Clark Mountain Range) | 2 | L (.1) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 (cont.) | | 8.5 | 10.0 | 1-4 | S | L (.5) | - | Potential habitat for 2 special-interest plants; adjacent to known GE/PF nesting habitat | 2,13a | N (0) | - | - |
| | | 10.0 | 13.0 | 1-4 | S | M (7) | - | Potential habitat for 2 special-interest plants; within BS habitat; adjacent to known GE/PF nesting habitat (Clark Mountain) | 2,11a, 13a | L (.1) | - | - |
| | | 13.0 | 14.0 | 1-4 | S | L (.5) | - | Potential habitat for 2 special-interest plants; adjacent to known GE/PF nesting habitat (Clark Mountain) | 2,13a | N (0) | - | - |
| | | 14.0 | 30.0 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 30.0 | 31.0 | 1,2 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 31.0 | 38.0 | 1,2 | S | L (.5) | - | Joshua tree woodland | 2 | L (.1) | - | - |
| | | 38.0 | 45.5 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |

Table 3-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

Table 4-16 (continued)
Impact Assesment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 (cont.) | | 45.5 | 47.2 | 1,2,4 | S | L (.5) | - | Potential DT habitat (low to moderate density) | 2 | L (.1) | - | - |
| | | 47.2 | 48.5 | 1,2 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 48.5 | 53.0 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 53.0 | 60.0 | 1,2,4 | S | L (.5) | - | Potential DT habitat (low density); adjacent to potential GE/PF nesting habitat; potential BS movement corridor | 2 | L (.1) | - | - |
| | | 60.0 | 64.0 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 64.0 | 82.0 | 1,2,4 | S | L (.5) | - | Potential DT habitat (low density); adjacent to potential GE/PF nesting habitat; adjacent to transient BS habitat | 2 | L (.1) | - | - |
| | | 82.0 | 83.3 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 13.5 | 0.0 | 2.7 | 1-4 | N | H (13) | Yes | Potential habitat for 2 special-interest plants; within and adjacent to BS habitat; adjacent to known GE/PF nesting habitat (Clark Mountain) | 11a, 13a | M (7) | - | - |
| | | 2.7 | 4.6 | 1-4 | N | M (9) | - | Potential habitat for 2 special-interest plants; potential DT habitat (low to moderate density) | 13a | M (7) | - | - |
| | | 4.6 | 13.5 | 1,2,4 | N | M (9) | - | Potential DT habitat (low to moderate density) | 11b, 13b | M (7) | - | Mitigation Measure 11b not committed to |
| 8 | 12.9 | 0.0 | 2.6 | 1-4 | S | M (7) | - | Potential habitat for 2 special-interest plants; within and adjacent to BS habitat; adjacent to GE/PF nesting habitat (Clark Mountain) | 2,4, 11a, 13a | N (0) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Line Number | Alternatives Length | Alternatives Begin | Alternatives End | Impact Type | Access Level | Initial Impact Level | Site-Specific Mitigation? | Resource Affected | Resource-Needed Mitigation | Residual Impact Level | Significant Mitigation? | Unavoidable Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 12.5 | 0.0 | 2.7 | 1-4 | N | H (15) | Yes | Potential habitat for 2 special-interest plants within and adjacent to 85 parcel(s) adjacent to known CNPS market habitat (Clark Mountain) | 11g, 13a | M (7) | - | - |
| | 2.7 | 6.6 | 1-4 | | N | M (9) | | Potential habitat for 2 special-interest plants adjacent to 7 habitat (low to moderate quality) | 13a | M (7) | - | - |
| | 6.6 | 12.5 | 1,2,4 | | N | M (9) | - | Potential CT habitat (low to moderate quality) | 11b, 13b | M (7) | - | Mitigation Measure 11b not committed to |
| 8 | 12.9 | 0.0 | 2.6 | 1-4 | S | M (7) | - | Potential habitat for 2 special-interest plants within and adjacent to 85 parcel(s) adjacent to CNPS market habitat (Clark Mountain) | 2,4, 11g, 13a | H (10) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 (cont.) | | 2.6 | 5.9 | 1-4 | S | L (.5) | - | Potential habitat for 2 special-interest plants; potential DT habitat (low to moderate density) | 2,13a | N (0) | - | - |
| | | 5.9 | 12.9 | 1,2,4 | S | L (.5) | - | Potential DT habitat (low to moderate density) | 2 | L (.1) | - | - |
| 9 | 25.0 | 0.0 | 2.0 | 1,2 | U | L (.5) | - | - | - | L (.5) | - | - |
| | | 2.0 | 10.6 | 1,2,4 | N | M (7) | - | - | - | M (7) | - | - |
| | | 10.6 | 11.5 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 11.5 | 24.0 | 1,2,4 | S | L (.5) | - | Potential DT habitat (low to moderate density) | 2 | L (.1) | - | - |
| | | 24.0 | 25.0 | 1,2,4 | S | M (7) | - | Desert wash; potential DT habitat (low to moderate density) | 2,8 | L (.5) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Lake Alternative | Length | Width Begin | Width End | Impact Type[2] | Access Level | Initial Impact Level[3] | Sig-nifi-cant?[7] | Resource Affected | Recom-mended Miti-gation | Residual Impact Level | Sig-nifi-cant?[7] | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 (cont.) | | 2.6 | 5.9 | 1-4 | S | L (.5) | - | Potential habitat for 2 special-interest plants; potential DT habitat (low to moderate sensitivity) | 2,13a | N (0) | - | - |
| | | 5.9 | 12.9 | 1,2,4 | S | L (.5) | - | Potential DT habitat (low to moderate density) | 2 | L (.1) | - | - |
| 9 | 35.0 | 0.0 | 2.0 | 1,2 | U | L (.5) | - | - | - | L (.5) | - | - |
| | | 2.0 | 10.6 | 1,2,4 | M | M (7) | - | | - | N (7) | - | - |
| | | 10.6 | 11.5 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 11.5 | 20.0 | 1,2,4 | S | L (.5) | - | Potential DT habitat (low to moderate density) | 2 | L (.1) | - | - |
| | | 20.0 | 25.0 | 1,2,4 | S | M (7) | - | Dense, new potential DT habitat (low to moderate sensitivity) | 2,9 | L (.5) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 19.9 | 0.0 | 9.0 | 1,2 | N | M (7) | - | - | - | M (7) | - | - |
| | | 9.0 | 12.0 | 1,2 | N | M (7) | - | - | - | M (7) | - | - |
| | | 12.0 | 14.5 | 1,2,4 | U | M (9) | - | Potential DT habitat (low to moderate density) | 11b, 13b | M (7) | - | Mitigation Measure 11b not committed to |
| | | 14.5 | 19.9 | 1,2,4 | U | M (9) | - | Potential DT habitat (moderate to high density) | 11b, 13b | L (1) | - | - |
| 11 | 20.5 | 0.0 | 0.7 | 1,2,4 | N | M (9) | - | Potential DT habitat (low to moderate density) | 11b, 13b | M (7) | - | Mitigation Measure 11b not committed to |
| | | 0.7 | 1.7 | 1,2,4 | N | M (7) | - | - | - | M (7) | - | - |
| | | 1.7 | 3.7 | 1,2 | N | M (7) | - | - | - | M (7) | - | - |
| | | 3.7 | 18.0 | 1,2,4 | N | M (7) | - | - | - | M (7) | - | - |
| | | 18.0 | 20.5 | 1,2,4 | N | H (13) | Yes | Desert wash (Mojave River Wash/Cronese Valley) | 8 | M (9) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Miles Begin | Miles End | Impact Type[a] | Access Level | Initial Impact Level[b] | Significant mitigation cost? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant mitigation cost? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 10.9 | 8.0 | 9.0 | 1,2 | N | M (2) | - | - | - | M (2) | - | - |
| | | 9.0 | 12.0 | 1,2 | N | M (2) | - | - | - | M (2) | - | - |
| | | 12.0 | 14.5 | 1,2,6 | U | M (9) | - | Potential DT habitat (low to moderate density) | 15, 16 | M (2) | - | Mitigation Measure 16 not committed to |
| | | 14.5 | 19.7 | 1,2,6 | U | M (9) | - | Potential DT habitat (moderate to high density) | 16, 15b | L (1) | - | - |
| 11 | 20.5 | 0.0 | 0.7 | 1,2,6 | N | M (9) | - | Potential DT habitat (low to moderate density) | 16, 15b | M (2) | - | Mitigation Measure 16 not committed to |
| | | 0.7 | 1.7 | 1,2,6 | N | M (2) | - | - | - | M (2) | - | - |
| | | 1.7 | 3.7 | 1,2 | N | M (2) | - | - | - | M (2) | - | - |
| | | 3.7 | 18.0 | 1,2,6 | N | M (2) | - | - | - | M (2) | - | - |
| | | 18.0 - | 20.5 | 1,2,6 | N | H (12) | Yes | Desert wash (Mojave River Wash/Cronese Valley) | 6 | M (2) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 4.9 | 0.0 | 1.0 | 1,2,4 | N | M (9) | - | Potential DT habitat (low to moderate density) | 11b, 13b | M (7) | - | Mitigation Measure 11b not committed to |
| | | 1.0 | 1.3 | 1,2,4 | N | M (7) | - | - | - | M (7) | - | - |
| | | 1.3 | 2.2 | - | N | M (7) | - | - | - | M (7) | - | - |
| | | 2.2 | 3.8 | 1,2,4 | N | M (7) | - | - | - | M (7) | - | - |
| | | 3.8 | 4.9 | 1,2,4 | N | H (13) | Yes | Desert wash | 1,8 | M (7) | - | - |
| 13 | 10.6 | 0.0 | 1.8 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 1.8 | 3.5 | 1,2,4 | S | M (7) | - | Desert wash | 8 | L (1) | - | - |
| | | 3.5 | 7.0 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 7.0 | 10.6 | 1,2,4 | U | L (.5) | - | - | - | L (.5) | - | - |
| 14 | 4.9 | 0.0 | 1.9 | 1,2,4 | N | M (7) | - | - | - | M (7) | - | - |
| | | 1.9 | 4.9 | 1,2,4 | N | H (13) | Yes | Desert wash (Mojave River Wash) | 8 | M (9) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 5.0 | 0.0 | 0.5 | 1-4 | N | H (13) | Yes | Desert wash (Mojave River Wash) | 8 | M (9) | - | - |
| | | 0.5 | 0.9 | 1,2,4 | N | M (7) | - | - | - | M (7) | - | - |
| | | 0.9 | 3.2 | 1,2,4 | N | H (13) | Yes | Known BS habitat (Cady Mountains) | 1,11a | M (9) | - | Mitigation Measure 11b not committed to |
| | | 3.2 | 5.0 | 12,4 | N | M (7) | - | - | - | M (7) | - | - |
| 16 | 8.6 | 0.0 | 0.3 | 1,2,4 | U | M (7) | - | - | - | M (7) | - | - |
| | | 0.3 | 3.5 | 1,2 | U | H (13) | Yes | Desert wash (Cronese Valley) | 4,8 | M (7) | - | - |
| | | 3.5 | 8.6 | 1,2,4 | N | M (7) | - | - | - | M (7) | - | - |
| 17 | 5.3 | 0.0 | 0.5 | 1-4 | N | H (13) | Yes | Desert wash (Mojave River Wash) | 8 | M (9) | - | - |
| | | 0.5 | 1.0 | 1,2,4 | N | M (7) | - | - | - | M (7) | - | - |
| | | 1.0 | 3.2 | 1,2,4 | N | H (13) | Yes | Known BS habitat (Cady Mountains) | 1,11a | M (9) | - | Mitigation Measure 11b not committed to |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Width | Land Type[1] | Impact Type[2] | Access Level | Initial Impact Level[3] | Significant Impact Level[4] | Resources Affected[5] | Recommended Mitigation | Residual Impact Level | Significant Impact Level[7] | Unavoidable Significant Impact Above Impact[8] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 3.0 | 1.0 | 0.5 | 1-4 | N | H (13) | Yes | Desert wash (Mojave River Wash) | 3 | M (9) | - | - |
| | | 0.5 | 0.5 | 1,2,4 | N | M (9) | - | - | - | M (9) | - | - |
| | | 0.9 | 3.2 | 1,2,4 | N | H (13) | Yes | Known BS habitat (Coso Mountains) | 1,11b | M (9) | - | Mitigation Measure 11b not completely in |
| | | 3.2 | 3.0 | 12,4 | N | M (9) | - | - | - | M (9) | - | - |
| 16 | 8.0 | 0.0 | 0.3 | 1,2,4 | U | M (9) | - | - | - | M (9) | - | - |
| | | 0.3 | 3.5 | 1,2 | U | H (13) | Yes | Desert wash (Coyote Valley) | 1,8 | M (9) | - | - |
| | | 3.5 | 8.6 | 1,2,4 | N | M (9) | - | - | - | M (9) | - | - |
| 17 | 5.3 | 0.0 | 0.5 | 1-4 | N | H (13) | Yes | Desert wash (Mojave River Wash) | 3 | M (9) | - | - |
| | | 0.5 | 1.0 | 1,2,4 | N | M (9) | - | - | - | M (9) | - | - |
| | | 1.0 | 3.2 | 1,2,4 | N | H (13) | Yes | Known BS habitat (Coso Mountains) | 1,11b | M (9) | - | Mitigation Measure 11b not completely |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17 (cont.) | | 3.2 | 5.3 | 1,2,4 | N | M (7) | - | - | - | M (7) | - | - |
| 18 | 3.7 | 0.0 | 3.7 | 1,2,4 | U | L (.5) | - | - | - | L (.5) | - | - |
| 19 | 7.9 | 0.0 | 7.9 | 1,2,4 | N | M (7) | - | - | - | M (7) | - | - |
| 20a | 21.0 | 0.0 | 8.8 | 1,2,4 | N | M (7) | - | - | - | M (7) | - | - |
| | | 8.8 | 11.0 | - | N | M (7) | - | - | - | M (7) | - | - |
| | | 11.2 | 14.4 | 1,2,4 | N | M (9) | - | Potential MGS habitat | - | M (9) | - | - |
| | | 14.4 | 18.5 | 1,2,4 | U | M (7) | - | Potential MGS habitat | - | M (7) | - | - |
| | | 18.5 | 21.0 | 1-4 | U | M (9) | - | Potential habitat for 2 special-interest plants; potential MGS habitat; adjacent to known GE/PF nesting habitat | 13a | M (7) | - | - |
| 20b | 17.9 | 0.0 | 2.7 | 1-4 | U | M (9) | - | Potential habitat for 2 special-status plants; potential MGS habitat; adjacent to known GE/PF nesting habitat | 13a | M (7) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Segment | Length | Mileposts Begin | Mileposts End | Impact Type[a] | Access Level | Initial Impact Level[b] | Sig-nifi-cant Impact Count[c] | Resource Affected[d] | Recom-mended Miti-gation | Residual Impact Level | Sig-nifi-cant Impact Count[c] | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17 (cont.) | | 3.2 | 5.3 | 1,2,4 | N | M (2) | - | - | - | M (2) | - | - |
| 18 | | 3.2 | 0.0 | 3,7 | 1,2,4 | U | L (3) | - | - | L (3) | - | - |
| 19 | | 2.5 | 0.0 | 7,9 | 1,2,4 | N | M (2) | - | - | M (2) | - | - |
| 20a | | 21.0 | 0.0 | 8,6 | 1,2,4 | N | M (2) | - | - | M (2) | - | - |
| | | 8.0 | 11.0 | - | - | N | M (2) | - | - | M (2) | - | - |
| | | 11.2 | 14.4 | 1,2,4 | N | M (2) | - | Potential MGS habitat | - | M (2) | - | - |
| | | 14.4 | 18.5 | 1,2,4 | U | M (2) | - | Potential MGS habitat | - | M (2) | - | - |
| | | 18.5 | 21.0 | 1,4 | U | M (2) | - | Potential habitat for 2 special-status species; potential MGS habitat; adjacent to low-in CCV riparian habitat | 17a | M (2) | - | - |
| 20b | | 17.9 | 0.0 | 2,1,4 | U | M (1) | - | Potential habitat for 2 special-status species; potential MGS habitat; adjacent to low-in CCV riparian habitat | 17a | M (1) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20b (cont.) | | 2.7 | 4.0 | 1-4 | N | H (13) | Yes | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (low to moderate density) | 11b, 13a | M (9) | - | Mitigation Measure 11b not committed to |
| | | 4.0 | 7.8 | 1-4 | N | H (13) | Yes | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 11b, 13a, 13b | L (1) | - | - |
| | | 7.8 | 8.5 | 1-4 | U | M (9) | - | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 11b, 13a, 13b | L (.5) | - | - |
| | | 8.5 | 11.0 | 1-4 | S | L (.5) | - | Potential habitat for 2 special-interest plants; potential MGS habitat | 2,13a | N (.1) | - | - |

Table 3-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Milepoists Begin | Milepoists End | Impact Type[a] | Access Level | Initial Impact Level[b] | Significant Mitigation Can? | Resources Affected[c] | Recommended Mitigation | Residual Impact Level | Significant Mitigation Can? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2[illegible] (cont'd) | | 2.7 | 6.0 | 1-A | 1 | H (3) | Yes | Potential habitat for 2 special-interest plants; potential MCS habitat; potential DT habitat (low to moderate density) | 1b, 1e | M (3) | – | Mitigation Measure 1b not commitment to |
| | | 6.0 | 7.6 | 1-A | 1 | H (3) | Yes | Potential habitat for 2 special-interest plants; potential MCS habitat; potential DT habitat (moderate to high density) | 1b, 1e, 1h | L (1) | – | – |
| | | 7.6 | 8.1 | 1-A | 1 | M (2) | | Potential habitat for 2 special-interest plants; potential MCS habitat; potential DT habitat (moderate to high density) | 1b, 1h, 1e | L (.5) | – | – |
| | | 8.5 | 11.0 | 1-A | 2 | L (.5) | | Potential habitat for 2 special-interest plants; potential DT habitat | 2,13e | M (.1) | – | – |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20b (cont.) | | 11.0 | 13.0 | 1-4 | S | M (7) | - | Potential habitat for a special-interest plant; potential MGS habitat; potential DT habitat (moderate to high density) | 2,11b, 13a, 13b | N (.1) | - | - |
| | | 13.0 | 17.9 | 1-4 | S | L (.5) | - | Potential habitat for a special-interest plant species; potential MGS habitat | 2,13a | N (.1) | - | - |
| 21a | 6.0 | 0.0 | 4.2 | 1,2,4 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 4.2 | 6.0 | - | S | L (.5) | - | - | - | L (.5) | - | - |
| 21b | 8.0 | 0.0 | 4.0 | - | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 4.0 | 8.0 | 1-4 | S | L (.5) | - | Potential habitat for a special-interest plant | 2,13a | N (.1) | - | - |
| 22 | 21.1 | 0.0 | 13.5 | 1,2,4 | U | L (.5) | - | - | - | L (.5) | - | - |
| | | 13.5 | 14.0 | - | U | L (.5) | - | - | - | L (.5) | - | - |
| | | 14.0 | 16.0 | 1,2,4 | U | L (.5) | - | - | - | L (.5) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Milepoints Begin | Milepoints End | Impact Type[a] | Access Level | Initial Impact Level[b] | Significant Mitigation Cost? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant Cost? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20b (cont'd) | | 11.0 | 13.0 | 1-4 | 5 | M (1) | - | Potential habitat for a special-interest plant; potential MCS habitat; potential CT habitat (moderate to high density) | 2,11b, 1fo, 12b | M (1) | - | - |
| | | 13.0 | 17.9 | 1-4 | 5 | L (5) | - | Potential habitat for a special-interest plant; potential MCS habitat | 2,12a | M (1) | - | - |
| 21a | 6.0 | 0.0 | 4.2 | 1,2,4 | 5 | L (5) | - | - | - | L (5) | - | - |
| | | 4.2 | 6.0 | - | 5 | L (5) | - | - | - | L (5) | - | - |
| 21b | 8.0 | 0.0 | 1.0 | - | 5 | L (5) | - | - | - | L (5) | - | - |
| | | 1.0 | 8.0 | 1-4 | 5 | L (5) | - | Potential habitat for a special-interest plant | 2,13a | M (1) | - | - |
| 22 | 21.1 | 0.0 | 13.5 | 1,2,4 | 1 | L (5) | - | - | - | L (5) | - | - |
| | | 13.5 | 14.0 | - | 1 | L (5) | - | - | - | L (5) | - | - |
| | | 14.0 | 16.0 | 1,2,4 | 1 | L (5) | - | - | - | L (5) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 (cont.) | | 16.0 | 21.1 | 1-4 | U | M (7) | - | Potential habitat for a special-interest plant | 13a | L (1) | - | - |
| 23 | 13.8 | 0.0 | 1.5 | 1,2,4 | S | M (7) | - | Desert wash (Mojave River) | 2,8 | L (.5) | - | - |
| | | 1.5 | 3.5 | 1-4 | S | L (.5) | - | Potential habitat for 2 special-interest plants | 2,13a | N (0) | - | - |
| | | 3.5 | 4.5 | 1,2 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 4.5 | 13.8 | 1-4 | S | L (.5) | - | Potential habitat for 2 special-interest plants | 2,13a | L (.1) | - | - |
| 24a | 27.3 | 0.0 | 8.0 | 1-4 | N | M (9) | - | Potential habitat for a special-interest plant; potential DT habitat (low to moderate density) | 13a | M (7) | - | - |
| | | 8.0 | 16.0 | 1-4 | N | H (13) | Yes | Potential habitat for 2 special-interest plants; potential DT habitat (moderate to high density) | 11b, 13a, 13b | L (1) | - | - |

Table 4-15 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Type[a] | Access Level | Initial Impact Level | Sig-nifi-cant? | Resource Affected[b] | Recommended Mitigation | Residual Impact Level | Sig-nifi-cant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 (cont.) | | 16.0 | 21.1 | 1-A | U | M (2) | - | Potential habitat for a special-interest plant | 13c | L (1) | - | - |
| 23 | 12.8 | 0.0 | 1.5 | 1,2,4 | S | M (1) | - | Desert wash (Mojave River) | 2,8 | L (5) | - | - |
| | | 1.5 | 3.5 | 1-A | S | L-(5) | - | Potential habitat for 2 special-interest plants | 2,13e | M (8) | - | - |
| | | 3.5 | 4.5 | 1,2 | S | L (5) | - | | | L (3) | - | - |
| | | 4.5 | 12.8 | 1-A | S | L (5) | - | Potential habitat for 2 special-interest plants | 2,13a | L (3) | - | - |
| 24a | 27.3 | 0.0 | 8.0 | 1-A | H | M (9) | - | Potential habitat for a special-interest plant; potential CT habitat (low to moderate density) | 13a | M (9) | - | - |
| | | 8.0 | 15.0 | 1-A | H | H (12) | Yes | Potential habitat for 2 special-interest plants; potential CT habitat (moderate to high density) | 11b, 13c, 13f | L (1) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24a (cont.) | | 16.0 | 17.8 | 1-4 | N | H (15) | Yes | Potential habitat for 2 special-interest plants; potential DT habitat (very high density) | 1,11b, 13a, 13b | M (7) | - | - |
| | | 17.8 | 18.8 | 1,2 | N | M (7) | - | - | - | M (7) | - | - |
| | | 18.8 | 19.8 | 1,2 | N | H (13) | Yes | Desert wash (Mojave River) | 1,8 | M (7) | - | - |
| | | 19.8 | 21.0 | 1,2 | N | M (7) | - | - | - | M (7) | - | - |
| | | 21.0 | 26.0 | 1-4 | N | H (13) | Yes | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (low to moderate density) | 11b, 13a | M (9) | - | Mitigation Measure 11b not committed to |
| | | 26.0 | 27.3 | 1-4 | N | H (13) | Yes | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 11a, 13a, 13b | L (1) | - | - |

Table A-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Line Marker | Length | Miles End | Miles Begin | Impact Type[a] | Access Level | Initial Impact Level[b] | Sig-nifi-cant? | Resources Affected | Recom-mended Miti-gation | Residual Impact Level | Sig-nifi-cant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24a (cont.) | | 16.0 | 17.8 | 1-5 | N | H (15) | Yes | Potential habitat for 2 special-interest plants; potential DT habitat (very high density) | 1,11b, 13b, 13b | M (7) | - | - |
| | | 17.8 | 18.8 | 1,2 | N | M (7) | - | - | - | M (7) | - | - |
| | | 18.8 | 19.8 | 1,2 | N | H (13) | Yes | Desert sunflower (Mojave River) | 1,8 | M (7) | - | - |
| | | 19.8 | 21.0 | 1,2 | N | M (7) | - | - | - | M (7) | - | - |
| | | 21.0 | 24.0 | 1-4 | N | H (13) | Yes | Potential habitat for 2 special-interest plants; potential MBS habitat; potential DT habitat (low to moderate density) | 11b, 13a | M (9) | - | Mitigation measures 11b not conducted initially |
| | | 24.0 | 27.1 | 1-4 | N | H (13) | Yes | Potential habitat for 2 special-interest plants; potential MBS habitat; potential DT habitat (very low to high density) | 11b, 13a, 11b | L (1) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24b | 6.1 | 0.0 | 6.1 | 1-4 | N | H (13) | Yes | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 11b, 13a, 13b | L (1) | - | - |
| 25 | 11.7 | 0.0 | 7.0 | 1-4 | S | L (.5) | - | Potential habitat for a special-interest plant; potential DT habitat (low to moderate density) | 2,13a | N (0) | - | - |
| | | 7.0 | 11.7 | 1-4 | S | M (7) | - | Potential DT habitat (moderate to high density) | 2,11b, 13b | L (.1) | - | - |
| 26 | 0.6 | 0.0 | 0.6 | 1-4 | N | M (9) | - | Potential habitat for a special-interest plant | 13a | M (7) | - | - |
| 27 | 13.4 | 0.0 | 6.5 | 1-4 | N | H (15) | Yes | Potential habitat for 2 special-interest plants; potential DT habitat (very high density) | 1,11b, 13a, 13b | M (9) | - | Mitigation Measure 11b not committed to |
| | | 6.5 | 8.0 | 1-4 | N | M (9) | - | Potential habitat for 2 special-interest plants | 13a | M (7) | - | - |

Table 9-15 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Lake Number | Length | Mileposts Begin | Mileposts End | Impact Type[a] | Access Impact Level | Initial Impact Level[b] | Significant Impact Cont? | Resource Affected | Recommended Mitigation | Residual Impact Level | Significant Impact Cont? | Unavoidable Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2Bb | 6.1 | 0.0 | 6.1 | I-A | H | H (13) | Yes | Potential habitat for 2 special-interest plants; potential MGS habitat; potential GT habitat (moderate to high density) | 11b, 13a, 13b | L (1) | - | - |
| 3S | 11.7 | 0.0 | 2.0 | I-A | S | L (3) | - | Potential habitat for a special-interest plant; potential GT habitat (low to moderate density) | 2,11a | M (0) | - | |
| | | 2.0 | 13.7 | I-A | S | M (7) | - | Potential GT habitat (moderate to high density) | 2,11b, 13b | L (1) | - | |
| 3B | 8.6 | 0.0 | 8.6 | I-A | H | M (0) | | Potential habitat for a special-interest plant | 3a | M (0) | - | - |
| 3T | 12.6 | 0.0 | 6.5 | I-A | H | H (17) | Yes | Potential habitat for 2 special-interest plants; potential GT habitat (very high density) | 1,11b, 13a, 13b | M (0) | - | Mitigation measures 11b and 13a are not feasible |
| 4J | 4.4 | 0.0 | 1.4 | I-A | H | M (9) | - | Potential habitat for 2 special-interest plants | 13a | M (0) | - | |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Sig-nifi-cant? | Resource Affected[d] | Recom-mended Miti-gation | Residual Impact Level | Sig-nifi-cant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 27 (cont.) | | 8.0 | 10.0 | 1-4 | N | H (13) | Yes | Potential habitat for 2 special-interest plants; potential DT habitat; (moderate to high density) | 11b, 13a, 13b | L (1) | - | - |
| | | 10.0 | 12.0 | 1-4 | U | M (9) | - | Potential habitat for 2 special-interest plants; potential DT habitat; (moderate to high density) | 11b, 13a, 13b | L (.5) | - | - |
| | | 12.0 | 13.0 | 1,2 | U | M (9) | - | Desert wash (Mojave River) | 4,8, | L (1) | - | - |
| | | 13.0 | 13.4 | 1,2 | U | H (13) | Yes | Riparian woodland (Mojave River) | 4,8 | M (7) | - | - |
| 28 | 3.2 | 0.0 | 0.6 | 1,2 | N | M (7) | - | - | - | M (7) | - | - |
| | | 0.6 | 3.2 | 1-4 | N | H (13) | Yes | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 11b, 13a, 13b | L (1) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Milepoints Begin | Milepoints End | Impact Types[a] | Access Level | Initial Impact Level[b] | Significant Mitigation Can? | Resource Affected[c] | Recommended Mitigation | Residual Impact Level | Significant Mitigation Can? | Unavoidable Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 (cont.) | | 0.0 | 10.0 | 1-4 | M | H (13) | Yes | Potential habitat for 2 special-interest plants; potential DT habitat (moderate to high density) | 11b, 12a, 13b | L (1) | - | - |
| | | 10.0 | 12.0 | 1-4 | U | M (3) | - | Potential habitat for 2 special-interest plants; potential DT habitat (moderate to high density) | 11a, 12a, 13b | L (3) | - | - |
| | | 12.0 | 13.0 | 1,2 | U | M (9) | - | Desert wash (Mojave River) | 9,8, | L (1) | - | - |
| | | 13.0 | 13.4 | 1,2 | U | H (13) | Yes | Riparian woodland (Mojave River) | 5,8 | M (7) | - | - |
| 23 | 3.2 | 0.0 | 0.6 | 1,2 | N | M (2) | - | - | - | M (2) | - | - |
| | | 0.6 | 3.2 | 1-4 | N | H (13) | Yes | Potential habitat for 2 special-interest plants; potential MCS habitat; potential DT habitat (moderate to high density) | 11b, 12b, 13b | L (1) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 | 2.1 | 0.0 | 2.1 | 1-4 | N | H (13) | Yes | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 11b, 13a, 13b | L (1) | - | - |
| 30 | 2.1 | 0.0 | 2.1 | 1-4 | S | M (7) | - | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density); Joshua tree woodland (Milepost 1.0-2.1) | 2,11b, 13a, 13b | N (0) | - | - |
| 31 | 5.7 | 0.0 | 5.7 | 1-4 | S | M (7) | - | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (low to moderate density); Joshua tree woodland (Mileposts 0.0-1.2, 2.0-3.4) | 2,13a | L (.5) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 32 | 16.4 | 0.0 | 7.6 | 1-4 | S | M (7) | - | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 2,11a, 13a, 13b | N (0) | - | - |
| | | 7.6 | 14.5 | 1-4 | S | L (.5) | - | Potential habitat for 2 special-interest plants; potential MGS habitat | 2,13a | N (0) | - | - |
| | | 14.5 | 14.6 | 1,2 | S | M (9) | - | Riparian woodland (Mojave River) | 2,8 | L (1) | - | - |
| | | 14.6 | 15.0 | 1,2 | S | M (7) | - | Desert wash (Mojave River) | 2,8 | L (.5) | - | - |
| | | 15.0 | 15.2 | 1,2 | S | L (.5) | - | - | - | L (.5) | - | - |
| | | 15.2 | 16.4 | 1-4 | S | L (.5) | - | Potential habitat for 2 special-interest plants; potential MGS habitat | 2,13a | N (0) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33 | 15.5 | 0.0 | 6.5 | 1-4 | S | M (7) | - | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 2,11b, 13a, 13b | N (0) | - | - |
| | | 6.5 | 8.2 | 1-4 | N | H (13) | Yes | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 11b, 13a, 13b | L (1) | - | - |
| | | 8.2 | 11.0 | 1-4 | N | M (9) | - | Potential habitat for 2 special-interest plants; potential MGS habitat | 13a | M (7) | - | - |
| | | 11.2 | 14.6 | 1-4 | S | L (.5) | - | Potential habitat for 2 special-interest plants; potential MGS habitat | 2,13a | N (0) | - | - |
| | | 14.6 | 14.8 | 1,2 | S | M (9) | - | Riparian woodland (Mojave River) | 2,4,8 | L (.5) | - | - |
| | | 14.8 | 15.5 | 1-4 | S | L (.5) | - | Potential habitat for 2 special-interest plants; potential MGS habitat | 2,13a | N (0) | - | - |

Table 4-15 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Milepost Begin | Milepost End | Impact Type[a] | Access Level | Initial Impact Level[b] | Significant Mitigation Cost? | Resource Affected | Percentage Residual Mitigation | Residual Impact Level | Significant Mitigation Cost? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33 | 15.5 | 0.0 | 5.5 | 1-A | S | M (2) | - | Potential habitat for 2 special-interest plants; potential MCS habitat; potential GT habitat (medium to high density) | 2,1b, 13a, 13b | M (0) | - | - |
| | 4.5 | 0.2 | 1-A | M | H (12) | Yes | Potential habitat for 2 special-interest plants; potential MCS habitat; potential GT habitat (medium to high density) | 1b, 13a, 13b | L (1) | - | - | |
| | 5.7 | 11.0 | 1-A | M | M (9) | - | Potential habitat for 2 special-interest plants; potential MCS habitat | 13a | M (1) | - | - | |
| | 11.7 | 15.6 | 1-A | S | L (3) | - | Potential habitat for 2 special-interest plants; potential MCS habitat | 2,13a | M (0) | - | - | |
| | 16.4 | 16.6 | 1-A | S | M (5) | - | E. Zonion endoliva (Monkey Flower) | 2,13a | L (3) | - | - | |
| | 16.8 | 15.5 | 1-A | S | L (3) | - | Potential habitat for 2 special-interest plants; potential MCS habitat | 2,13a | M (0) | - | - | |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 34 | 1.4 | 0.0 | 1.0 | 1-4 | S | L (.5) | - | Potential habitat for 2 special-interest plants; potential MGS habitat | 2,13a | N (0) | - | - |
| | | 1.0 | 1.4 | 1,2,4 | S | M (7) | - | Desert wash; potential MGS habitat | 2,8 | L (.5) | - | - |
| 35 | 4.7 | 0.0 | 4.7 | 1-4 | S | L (.5) | - | Potential habitat for 2 special-interest plants; potential MGS habitat | 2,13a | N (0) | - | - |
| 36 | 5.8 | 0.0 | 2.5 | 1-4 | N | H (13) | Yes | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 11b, 13a, 13b | L (1) | - | - |
| | | 2.5 | 4.3 | 1-4 | U | M (9) | - | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 2,11b, 13a, 13b | L (.1) | - | - |

Table 4-15 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36 (cont.) | | 4.3 | 5.8 | 1-4 | N | H (13) | Yes | Joshua tree woodland; potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 11b, 13a, 13b | L (1) | - | - |
| 37 | 7.3 | 0.0 | 5.0 | 1-4 | N | H (13) | Yes | Potential habitat for 3 special-interest plants; potential MGS habitat; potential DT habitat (low to moderate density) | 11b, 13a, 13b | M (7) | - | Mitigation Measure 11b not committed to |
| | | 5.0 | 7.3 | 1-4 | N | H (13) | Yes | Potential habitat for 3 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density); Joshua tree woodland (Milepost 6.8-7.3) | 11b, 13a, 13b | L (1) | - | - |

Table 6-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 38 | 10.3 | 0.0 | 4.6 | 1-4 | S | M (7) | - | Potential habitat for 3 special-interest plants; potential MGS habitat; potential DT habitat (low to moderate density) | 2,13a | L (.5) | - | - |
| | | 4.6 | 5.2 | 1-4 | N | H (13) | - | Potential habitat for 3 special-interest plants; potential MGS habitat; potential DT habitat (low to moderate density) | 2,13a | M (7) | - | - |
| | | 5.2 | 10.3 | 1-4 | S | M (7) | - | Potential habitat for 3 special-interest plants; potential MGS habitat; potential DT habitat (low to moderate density); Joshua tree woodland (Milepost 9.7-10.3) | 2,13a | L (.5) | - | - |

Table 9-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Location | Milepoints Begin | Milepoints End | Impact Type[a] | Access Level | Initial Impact Level[b] | Significant Mitigation Con't? | Resource Affected[c] | Recommended Mitigation | Residual Impact Level | Significant Mitigation Con't? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 32 | 10.3 | 0.0 | 4.6 | 1-4 | S | M (7) | - | Potential habitat for 3 special-interest plants; potential MCS habitat; potential DT habitat (low to moderate density) | 2,13a | L (.5) | - | - |
| | | 4.6 | 5.2 | 1-4 | M | H (13) | - | Potential habitat for 3 special-interest plants; potential MCS habitat; potential DT habitat (low to moderate density) | 2,13a | M (7) | - | - |
| | 5.2 | 10.3 | 1-4 | S | M (7) | - | Potential habitat for 3 special-interest plants; potential MCS habitat; potential DT habitat (low to moderate density); Indian tree snake/Mitigation 2,7-10,11 | 2,13a | L (.5) | - | | |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 39 | 6.2 | 0.0 | 6.2 | 1-4 | S | M (7) | - | Potential habitat for 3 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density); Joshua tree woodland (Milepost 0.0-0.5) | 2,11a, 13a, 13b | N (0) | - | - |
| 40a | 6.2 | 0.0 | 6.2 | 1-4 | S | M (7) | - | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 2,11b, 13a, 13b | N (0) | - | - |
| 40b | 4.9 | 0.0 | 4.9 | 1-4 | S | M (7) | - | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 2,11b, 13a, 13b | N (0) | - | - |

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

Table 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Significant? | Resource Affected[d] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41 | 15.5 | 0.0 | 15.0 | 1-4 | S | M (7) | - | Potential habitat for 3 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 2,11b, 13a, 13b | N (0) | - | - |
| | | 15.0 | 15.5 | 1-4 | S | M (7) | - | Potential habitat for 3 special-interest plants; potential MGS habitat; potential DT habitat (low to moderate density) | 2,13a | L (.5) | - | - |
| 42 | 21.9 | 0.0 | 2.4 | 1-4 | N | H (13) | Yes | Potential habitat for 3 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 11b, 13a, 13b | L (1) | - | - |
| | | 2.4 | 21.9 | 1-4 | U | M (9) | - | Potential habitat for 3 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 11b, 13a, 13b | L (.5) | - | - |

Table 3-35 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

Tabel 4-16 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Mileposts Begin | Mileposts End | Impact Types[a] | Access Level | Initial Impact Level[c] | Sig-nifi-cant? | Resource Affected[d] | Recom-mended Miti-gation | Residual Impact Level | Sig-nifi-cant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 43 | 3.9 | 0.0 | 3.9 | 1-4 | N | H (13) | Yes | Potential habitat for 2 special-interest plants; potential MGS habitat; potential DT habitat (moderate to high density) | 11b, 13a, 13b | L (1) | - | - |
| 44 | 16.2 | 0.0 | 3.4 | 1,2,4 | U | L (.5) | - | - | - | L (.5) | - | - |
| | | 3.4 | 12.5 | 1,2 | N | M (7) | - | - | - | M (7) | - | - |
| | | 12.5 | 16.2 | 1,2,4 | N | M (9) | - | Adjacent to known GE/PF nesting habitat; potential habitat for 2 special-interest plants | 13a | M (7) | - | - |
| 45 | 5.7 | 0.0 | 4.5 | 1,2,4 | N | M (7) | - | - | - | M (7) | - | - |
| | | 4.5 | 5.7 | 1,2 | N | M (7) | - | - | - | M (7) | - | - |

[a]Impact Types: 1 = effects on vegetation; 2 = effects on wildlife; 3 = effects on legally protected species (animals only); and 4 = effects on species of special-interest (plants and animals).

[b]Access level categories: S = existing access roads are sufficient; U = existing access roads require upgrading; and N = new access required.

[c]Initial impact level: a 4 level rating of impact magnitude and significance based on impact intensity and resource sensitivity. N = negligible; L = low; M = moderate; and H = high.

[d]Only resources of moderate, high, or very high sensitivity are listed. DT = desert tortoise; BS = bighorn sheep; MGS = Mohave ground squirrel; GM = Gila monster; GE = golden eagle; PF = prairie falcon.

Table A-15 (continued)
Impact Assessment/Mitigation Planning Chart
Biological Resources

| Link Number | Length | Milepsts Begin | Milepsts End | Impact Types[a] | Access Level | Initial Impact Level[b] | Significant? | Resource Affected[c] | Recommended Mitigation | Residual Impact Level | Significant? | Unavoidable Significant Adverse Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 43 | 3.9 | 0.0 | 3.9 | 1-4 | N | M (13) | Yes | Potential habitat for 2 special-interest plants; potential MGS habitat; potential OT habitat (moderate to high density) | 11b, 12a, 13b | L (1) | - | - |
| 44 | 16.2 | 0.0 | 3.4 | 1,2,4 | U | L (5) | - | - | - | L (5) | - | - |
| | | 3.4 | 12.5 | 1,2 | N | M (7) | - | - | - | M (7) | - | - |
| | | 12.5 | 16.2 | 1,2,4 | N | M (9) | - | Adjacent to known CS-1 setting habitat; potential habitat for 2 special-interest plants | 13a | M (7) | - | - |
| 45 | 5.7 | 0.0 | 4.5 | 1,2,4 | N | M (7) | - | - | - | M (7) | - | - |
| | | 4.5 | 5.7 | 1,2 | N | M (7) | - | - | - | M (7) | - | - |

[a]Impact Types: 1 = effects on vegetation; 2 = effects on wildlife; 3 = effects on legally protected species (animals only); and 4 = effects on species of special-interest (plants and animals).

[b]Access level categories: S = existing access roads are sufficient; U = existing access roads require upgrading; and N = new access required.

[c]Impact Level: a 4 level rating of impact magnitude and significance based on impact intensity and resource sensitivity. N = negligible; L = low; M = moderate; and H = high.

[d]Only resources of moderate, high, or very high sensitivity are listed. OT = desert tortoise; BS = bigcone sheep; MGS = Mohave ground squirrel; and OT = Ocotillo monster; GS = golden eagle; PF = prairie falcon.

# APPENDIX A

## PLANT SPECIES OF POTENTIAL SPECIAL INTEREST REVIEWED AND REMOVED FROM FURTHER CONSIDERATION

TABLE A-1
PLANT SPECIES OF POTENTIAL SPECIAL INTEREST REVIEWED AND REMOVED FROM FURTHER CONSIDERATION[a]

| Scientific Name | Occurrence | Federal Candidate Status[b] 1980 | Federal Candidate Status[b] 1983 | CNPS Lists[c] 1980 | CNPS Lists[c] 1984 | NNPS List[d] | Reason for No Further Consideration |
|---|---|---|---|---|---|---|---|
| Agave utahensis var. eborspina | NV, CA | 2 | 2 | 4 | 2 | W | Not in study area in California; not expected near corridors in Nevada |
| A. utahensis var. nevadensis | NV | 2 | 3C | - | - | W | Dropped from Federal candidate list |
| Arctomecom merriamii | CA, NV | 2 | 3C | 4 | 2 | W | Dropped from Federal candidate list |
| Astraglus cimae var. cimae | CA, NV | 2 | 3C | 2 | IB | OR | Dropped from Federal candidate list |
| A. convallarius var. finitimus | NV | 2 | 2 | - | - | W | Not in study area in Nevada |
| A. funereus | CA, NV | I | 2 | 2 | IB | W | Not in study area in California or Nevada |
| A. geyeri var. triguetrus | NV | I | I | - | - | FCT | Not in study area in Nevada |
| A. lentiginous var. sesquimetralis | CA, NV | I | I | 2 | IB | FCE | Not in study area in California or Nevada |
| A. lentiginous var. latus | NV | 2 | 3C | - | - | - | Dropped from Federal candidate list |
| A. mohavensis var. hemigyrus | CA, NV | I | 2 | 2 | AI | FCE | Not in study area in California or Nevada |
| A. oophrus var. lonchocalyx | NV | 2 | 3C | 0 | - | W | Dropped from Federal candidate list |
| Brickellia knappiana | CA, NV | 2 | 3C | 2 | 3 | W | Dropped from Federal candidate list |

TABLE A-1

PLANT SPECIES OF POTENTIAL SPECIAL INTEREST REVIEWED AND REMOVED FROM FURTHER CONSIDERATION[a]

| Scientific Name | Occurrence | Federal Candidate Status[b] 1980 | 1983 | CNPS List[c] 1980 | 1984 | NNPS List[d] | Reason for No Further Consideration |
|---|---|---|---|---|---|---|---|
| *Agave utahensis* var. *eborispina* | NV, CA | 2 | 2 | 4 | 2 | W | Not in study area in California; not expected near caldera in Nevada |
| *A. utahensis* var. *nevadensis* | NV | 2 | 3C | – | – | W | Dropped from Federal candidate list |
| *Arctomecon merriamii* | CA, NV | 2 | 3C | 4 | 2 | W | Dropped from Federal candidate list |
| *Astragalus ginoux* var. *cottam* | CA, NV | 2 | 3C | 1 | 1B | CN | Dropped from Federal candidate list |
| *A. oophalidus* var. *finitimus* | NV | 2 | 2 | – | – | W | Not in study area in Nevada |
| *A. hoppiae* | CA, NV | 1 | 2 | 2 | 1B | W | Not in study area in California or Nevada |
| *A. newelli* var. *kingstonensis* | NV | 1 | 1 | – | – | FLT | Not in study area in Nevada |
| *A. lentiginosus* var. *sesquimetralis* | CA, NV | 1 | 1 | 2 | 1B | FCE | Not in study area in California or Nevada |
| *A. lentiginosus* var. *latus* | NV | 2 | 3C | – | – | – | Dropped from Federal candidate list |
| *A. monoensis* var. *finitimus* | CA, NV | 1 | 3 | 2 | A1 | FCE | Not in study area in California or Nevada |
| *A. scopulicus* var. *beatricae* | NV | 2 | 3C | 0 | – | W | Dropped from Federal candidate list |
| *Balsamorhiza sagittata* | CA, NV | 2 | 3C | 2 | 2 | W | Dropped from Federal candidate list |

Table A-1 (continued)
Plant Species of Potential Special Interest

| Scientific Name | Occurrence | Federal Candidate Status[b] 1980 | Federal Candidate Status[b] 1983 | CNPS Lists[c] 1980 | CNPS Lists[c] 1984 | NNPS List[d] | Reason for No Further Consideration |
|---|---|---|---|---|---|---|---|
| Calochortus striatus | CA, NV | 2 | 3C | 2 | IB | W | Dropped from Federal candidate list |
| Coryphantha vivipara var. rosea | CA, NV | 2 | 3C | 2 | IB | W | Dropped from Federal candidate list |
| Cryptantha insolita | NV | 1 | 2 | - | - | FCE | Not in study area in Nevada; probably extinct |
| C. tumulosa | NV | 1 | 3C | - | - | W | Dropped from Federal candidate list |
| Dalea arborescens | CA | 3C | 3C | AI | 4 | - | Dropped from Federal candidate list |
| Enceliopsis nudicalis var. corrugata | NV | 1 | 1 | - | - | FCE | Not in study area in Nevada |
| Ephedra funera | CA, NV | 3C | 3C | AI | AI | - | Dropped from Federal candidate list |
| Epilobium nevadensis | NV | 1 | 2 | - | - | W | Not expected near corridors in Nevada |
| Forsellesia pugens var. corrugata | CA, NV | 2 | 3C | 2 | IB | W | Dropped from Federal candidate list |
| Galium hilendiae ssp. kingstonensis | CA, NV | 1 | 2 | 2 | IB | FCT | Not in study area in California or Nevada |
| Gilia ripleyi | NV | 3C | 3C | - | - | OR | Dropped from Federal candidate list |
| Haplopappus brickelliodes | CA, NV | 3C | 3C | AI | - | OR | Dropped from Federal candidate list |

Table A-1 (continued)
Plant Species of Potential Special Interest

| Scientific Name | Occurrence | Federal Candidate Status[1] 1980 | 1983 | CDFG Listed 1980 | 1984 | 1987 List[2] | Reason for its Further Consideration |
|---|---|---|---|---|---|---|---|
| Calochortus striatus | CA, NV | 2 | 3C | 2 | 1B | W | Dropped from Federal candidate list |
| Caryopsis [illegible] var. [illegible] | CA, NV | 2 | 3C | 2 | 1B | W | Dropped from Federal candidate list |
| Cryptantha [illegible] | NV | 1 | 2 | - | - | FCE | Not in study area in Nevada; probably extinct |
| C. [illegible] | NV | 1 | 3C | - | - | W | Dropped from Federal candidate list |
| Dalea [illegible] | CA | 3C | 3C | A1 | 3 | - | Dropped from Federal candidate list |
| Eucnide [illegible] var. [illegible] | NV | 1 | 1 | - | - | FCE | Not in study area in Nevada. |
| [illegible] | CA, NV | 3C | 3C | A1 | A1 | - | Dropped from Federal candidate list |
| [illegible] | NV | 1 | 2 | - | - | W | Not protected near [illegible] in [illegible] |
| [illegible] var. [illegible] | CA, NV | 3 | 3C | 2 | 1B | W | Dropped from Federal candidate list |
| [illegible] | CA, NV | 1 | 2 | 3 | 1B | FCT | Not in study area in California or Nevada. |
| [illegible] | NV | 3C | 3C | - | - | OR | Dropped from Federal candidate list |
| [illegible] | CA, NV | 3C | 3C | A1 | - | OR | Dropped from Federal candidate list |

Table A-1 (continued)
Plant Species of Potential Special Interest

| Scientific Name | Occurrence | Federal Candidate Status[b] 1980 | Federal Candidate Status[b] 1983 | CNPS Lists[c] 1980 | CNPS Lists[c] 1984 | NNPS List[d] | Reason for No Further Consideration |
|---|---|---|---|---|---|---|---|
| Hemizonia mojavensis | CA | 1 | 1 | 1 | 1A | - | Not expected near corridors in California |
| Ivesia cryptocaulis | NV | 1 | 2 | - | - | W | Not expected near corridors in Nevada |
| Linanthus arenicola | CA, NV | 3C | 3C | 4 | 2 | - | Dropped from Federal candidate list |
| Mentzelia leucophylla | NV | 1 | 1 | - | - | FCE | Not in study area in Nevada |
| Opuntia basilaris var. brachyclada | CA | 1 | 2 | 2 | 1B | - | Not expected near corridors in California |
| O. phaeacantha var. mojavensis | CA | 2 | 3B | 2 | A1 | - | Dropped from Federal candidate list |
| Penstomen fruticiformis ssp. amargosae | CA, NV | 1 | 2 | 2 | 4 | FCT | Not in study area in California or Nevada |
| P. stephensii | CA | 2 | 2 | 2 | 1B | - | Not in study area in California |
| Perityle megalocephala | CA, NV | 2 | 3C | A1 | A1 | OR | Dropped from Federal candidate list |
| Pholisma arenarium | CA, NV | 3C | 3C | 4 | A1 | - | Dropped from Federal candidate list |

Table A-1 (continued)
Plant Species of Potential Special Interest

| Scientific Name | Occurrence | Federal Candidate Status[b] 1980 | 1983 | CDFG List[c] 1980 | 1984 | NPS List[d] |
|---|---|---|---|---|---|---|
| Hemizonia mojavensis | CA | 1 | 1 | 1 | 1A | - |
| Ivesia cryptocaulis | NV | 1 | 2 | - | - | W |
| Lupinus ludovicianus | CA, NV | 3C | 3C | 4 | 2 | - |
| Mentzelia leucophylla | NV | 1 | 1 | - | - | FCE |
| Opuntia basilaris var. brachyclada | CA | 1 | 2 | 2 | 1B | - |
| O. phaeacantha var. laxispinula | CA | 2 | 3B | 2 | A1 | - |
| Physaria tenuifolia ssp. arenosa | CA, NV | 1 | 2 | 2 | A | FCT |
| P. stenogenus | CA | 2 | 2 | 2 | 1B | |
| Quillajia megalocephala | CA, NV | 2 | 3C | A1 | A1 | OR |
| Rhytidoma orcuttianum | CA, NV | 3C | 1C | 4 | A1 | - |

| Scientific Name | Reason for No Further Consideration |
|---|---|
| Hemizonia mojavensis | Not expected near corridors in California |
| Ivesia cryptocaulis | Not expected near corridors in Nevada |
| Lupinus ludovicianus | Dropped from Federal candidate list |
| Mentzelia leucophylla | Not in study area in Nevada |
| Opuntia basilaris var. brachyclada | Not expected near corridors in California |
| O. phaeacantha var. laxispinula | Dropped from Federal candidate list |
| Physaria tenuifolia ssp. arenosa | Not in study area in California or Nevada |
| P. stenogenus | Not in study area in California |
| Quillajia megalocephala | Dropped from Federal candidate list |
| Rhytidoma orcuttianum | Dropped from Federal candidate list |

Table A-1 (continued)
Plant Species of Potential Special Interest

| Scientific Name | Occurrence | Federal Candidate Status[b] 1980 | Federal Candidate Status[b] 1983 | CNPS Lists[c] 1980 | CNPS Lists[c] 1984 | NNPS List[d] | Reason for No Further Consideration |
|---|---|---|---|---|---|---|---|
| Potentilla patellifera | CA | 2 | 2 | 2 | IB | - | Not in study area in California |
| Silene clokeyi | NV | 1 | 2 | - | - | W | Not in study area in Nevada |

[a]These species were not considered further in the site-specific analysis to this project because: (1) they have been removed from the Federal candidate list recently; (2) they are not known to occur in the study area; or (3) they are not expected to occur near the alternative corridors.

[b]Based on lists from USFWS (1980, 1983). See Table 4-5 for explanation of category designations.

[c]California Native Plant Society (CNPS) 1980 and 1984 lists. See Table 4-5 for references and explanation of lists.

[d]Northern Nevada Native Plant Society (NNPS) 1984 lists of rare plants. See Table 4-5 for references and explanation of lists.

Table A-1 (continued)
Plant Species of Potential Special Interest

| Scientific Name | Occurrence | Federal Candidate Status[a] 1980 | 1991 | CNPS List[c] 1983 | 1994 | NPS List[d] | Reason for Its Further Consideration |
|---|---|---|---|---|---|---|---|
| *Potentilla gorodkovii* | | | | | | | |
| *Stylocline sinkiana* | | | | | | | |
| | CA | 2 | 2 | 2 | 1B | - | Not in study area in California |
| | NV | 1 | 2 | - | - | W | Not in study area in Nevada |

[a] These species were not considered further in the site-specific analysis in this project because: (1) they have been removed from the Federal candidate list recently; (2) they are not known to occur in the study area; or (3) they are not associated in some way the alternative sites.

[b] Based on data from Lee WS (1990, 1993). See Table 3-5 for explanation of category designations.

[c] California Native Plant Society (CNPS) 1983 and 1994 lists. See Table 3-5 for explanation and explanation of lists.

[d] Nevada Native Plant Society (NNPS) 1994 list of rare plants. See Table 3-5 for explanation and explanation of lists.

# APPENDIX B

## DETAILED DESCRIPTION OF BIOLOGICAL RESOURCES WITHIN AND ADJACENT TO ALTERNATIVE CORRIDORS

TABLE B-1
INVENTORY OF BIOLOGICAL RESOURCES WITHIN AND ADJACENT TO CORRIDORS[a]

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 0 | 0.0 | 3.0 | 3.0 | Broad alluvial fan, sandy soils | CBS; large creosote bushes with few other shrubs; other species: Oenothera spp., Baileya spp. and Brickellia spp. | Scrub habitat species expected; 3 ravens observed | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 3.0 | 3.1 | 0.1 | Broad sandy wash | DW; dominated by creosote bush and Acacia greggii | Scrub habitat species expected | None | Potential Gila monster habitat at Milepost 2.7, and eastward; potential desert tortoise habitat (0 to 50 density class) |
| | 3.1 | 5.3 | 2.2 | Broad alluvial fan | CBS; see species list, Table C-1 | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 5.3 | 8.0 | 2.7 | Edge of dry lake | CBS and SS transition; by Atriplex polycarpa | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 8.0 | 9.9 | 1.9 | Edge of dry lake | CBS and SS transition; dominated by creosote bush and alkali grasses: Bouteloua ssp. and Erioneuron pulchellum | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class); 3 miles northwest of potential golden eagle and prairie falcon nesting habitat on Eldorado Mountain |
| | 9.9 | 12.7 | 2.8 | Lower alluvial fan | CBS and SS transition; dominated by Atriplex polycarpa | Scrub habitat species expected; horn larks observed | None | Potential desert tortoise habitat (0 to 50 density class) |

TABLE B-1

INVENTORY OF BIOLOGICAL RESOURCES WITHIN AND ADJACENT TO CORRIDORS[a]

| Milepost | | | Topographic Location | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] | |
|---|---|---|---|---|---|---|---|
| Begin | End | Length | | | | Plants | Wildlife |
| 0.0 | 3.0 | 3.0 | Broad alluvial fan, nearly nulls | CSS; large coastal buckwheat with few other shrubs; other species: Ceanothus spp., Salvia spp., and Dyssodia spp. | Scrub habitat species expected; 1 raptor observed | None | Potential desert tortoise habitat (0 to 30 density class) |
| 3.0 | 3.1 | 0.1 | Broad nearly nulls | DW; dominated by creosote bush and Acacia greggii | Scrub habitat species not | None | Potential Gila monster habitat or Mojave 2.4, and nesting potential desert tortoise habitat (0 to 30 density class) |
| 3.1 | 5.3 | 2.2 | Broad alluvial fan | CSS; see species list, Table C-1 | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 30 density class) |
| 5.3 | 8.0 | 2.7 | Edge of dry lake | CSS and SS transition by Atriplex polycarpa | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 30 density class) |
| 8.0 | 9.2 | 1.2 | Edge of dry lake | CSS and SS transition dominated by creosote bush and shrub species; Dodonaea spp., and Chamaeraca polifolium | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 30 density class); 2 miles northwest of potential golden eagle and prairie falcon nesting habitat on Chemehuevi Mountain |
| 9.2 | 12.7 | 3.5 | Lower alluvial fan | CSS and SS transition dominated by Atriplex polycarpa | Scrub habitat species expected from field observation | None | Potential desert tortoise habitat (0 to 30 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 0 (cont.) | 12.7 | 13.5 | 0.8 | Lower alluvial fan | CBS; no associated subshrubs | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |
| 1 | 0.0 | 2.2 | 2.2 | Lower alluvial fan | CBS; few associated subshrubs; Bouteloua spp. common | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 2.2 | 3.2 | 1.0 | Lower alluvial fan | CBS | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 3.2 | 5.2 | 2.0 | Upper alluvial fan | CBS; other species include Psilostrophe cooperi, Chrysothamnus spp., Hymenoclea salsola, and Lycium cooperi | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 5.2 | 6.7 | 1.5 | Narrow canyon floor | DW; dominated by Acacia greggii and Opuntia acanthocarpa | Scrub habitat species expected; ravens, cactus wren nest, and white-tailed antelope squirrel observed | Potential habitat for bicolored penstemons and Nelson's phacelia | Potential desert tortoise habitat (0 to 50 density class); potential Gila monster habitat; adjacent to potential golden eagle and prairie falcon nesting habitat |
| | 6.7 | 11.2 | 4.5 | Rugged mountain slopes (McCullough Mountain) | CBS; species-rich phase (see species list, Table C-2) | Scrub habitat species expected | Potential habitat for bicolored penstemons and Nelson's phacelia | Known bighorn sheep habitat on McCullough Mountain; adjacent to golden eagle and prairie falcon nesting habitat |

Table B-1 (continued)
Inventory of Biological Resources

| Tab. | Mileposts | | | Topographic Conditions | Vegetative Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] | |
|---|---|---|---|---|---|---|---|---|
| | Begin | End | Length | | | | Plants | Wildlife |
| 6 (cont.) | 12.7 | 13.5 | 0.8 | Lower alluvial fan | (DB) no associated subhabitats | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 30 density class) |
| 7 | 0.0 | 2.2 | 2.2 | Lower alluvial fan | (DS) few associated subhabitats Quaternary sp. expansion | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 30 density class) |
| | 2.2 | 3.2 | 1.0 | Lower alluvial fan | (DB) | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 30 density class) |
| | 3.2 | 5.2 | 2.0 | Lower alluvial fan | (DR) other species include Phacelia ciliata, Cryptantha wooni, Viguiera reticulata and Lycium cooperae | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 30 density class) |
| | 5.2 | 6.7 | 1.5 | Alluvial channel floor | (DA) dominated by Acacia greggii and Larrea tridentata | Scrub habitat species expected, including ocotillo, cactus wren nest, and white-tailed antelope ground squirrel sign and | Potential habitat for Mojave yucca, ephedra and Nolina bigelovii | Potential desert tortoise habitat (0 to 30 density class); potential Colo. desert fringe-toed lizard habitat adjacent to potential golden eagle and prairie falcon nesting habitat |
| | 6.7 | 11.7 | 5.0 | Topographically diverse high stream (Mock Springs Mountain) | (DB) quaternary plants four species (Yucca, Ephedra, Nolina, Larrea) | Scrub habitat species expected | Potential habitat for Joshua tree, ephedra and Nolina bigelovii | Known burrows, sheep habitat on Mock Springs Mountain; potential golden eagle and prairie falcon nesting habitat |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 1 (cont.) | 11.2 | 15.0 | 3.8 | Upper alluvial fan; sandy soils soils | CBS; associated species include Opuntia ramosissima, O. echinocarpa, Hilaria rigida, Sporobolus contractus, and Lycium cooperi | Scrub habitat species expected; house finches observed | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 15.0 | 16.6 | 1.6 | Bajadas and slope bases | CBS (as above) with stand of Yucca schidigera between Milepost 16.0 to 16.6; surrounding hills sparsely vegetated but abundant with cacti | Scrub habitat species expected | None | Potential desert tortoise habitat (40 to 90 density class); adjacent to transient bighorn sheep habitat, Milepost 16.0 to 16.5 (Sheep Mountain) |
| 2 | 0.0 | 4.5 | 4.5 | Alluvial fan and slope base | CBS with stand of Yucca schidigera between Mileposts 0.0 and 2.0 | Scrub habitat species expected; American kestrel sighted at Milepost 4.0 | None | Potential desert tortoise habitat (40 to 90 density class to Milepost 2.0; 0 to 50 to Milepost 4.5); traverses edge of transient bighorn sheep habitat along Milepost 1.5 to 3.0 (Roach Mountains) |
| | 4.5 | 5.5 | 1.0 | Edge of playa | CBS and SS transition; SS contains A. canescens and A. confertifolia | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 5.5 | 6.5 | 1.0 | Edge of playa | CBS | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 3 | 0.0 | 4.0 | 4.0 | Edge of playa | CBS; Yucca schidigera between Mileposts 0.0 and 2.0 | Scrub habitat species expected; horned larks and raven observed | None | Potential desert tortoise habitat (40 to 90 density class to Milepost 2.0; 0 to 50 density class to Milepost 4.0); prairie falcon observed |
| | 4.0 | 4.2 | 0.2 | Edge of playa | CBS and SS transition | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class); prairie falcon observed nearby |
| | 4.2 | 8.4 | 4.2 | Edge and center of playa (Roach Dry Lake) | SS and barren lands | Scrub habitat species expected in low numbers; raven observed | None | None |
| 4 | 0.0 | 1.0 | 1.0 | Edge of playa | CBS | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 1.0 | 1.9 | 0.9 | Edge of playa | CBS and SS | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |
| 5a | 0.0 | 0.2 | 0.2 | Broad sandy plain | CBS | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |
| 5b | 0.0 | 3.5 | 3.5 | Broad sandy plain | CBS | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 3.5 | 4.0 | 0.5 | Edge of playa | SS | Scrub habitat species expected in low numbers | None | None |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 5b (cont.) | 4.0 | 4.8 | 0.8 | Dry lake (Ivanpah Dry Lake) | Barren | None | None | None |
| 5c | 0.0 | 1.0 | 1.0 | Dry lake (Ivanpah Dry Lake) | Barren | None | None | None |
| | 1.0 | 6.5 | 5.5 | Edge of playa, lower bajada | CBS at lower slopes; CBS with enriched flora at high slopes (see species list, Table C-3) | Scrub habitat species expected; red-tailed hawk and cactus nests observed | None | Potential desert tortoise habitat (40 to 155 density class) |
| | 6.5 | 12.3 | 5.8 | Lower mountain slopes (Clark Mountain) | BS (see species list, Table C-4) | Scrub habitat species expected; white-tailed antelope squirrels observed | Potential habitat for Nelson's phacelia and Rusby's desert mallow | Potential Gila monster habitat up to 4,000 feet elevation; known golden eagle nesting sites 2 to 3 miles northwest on Clark Mountain; bighorn sheep habitat adjacent from Milepost 10.0 to 11.0 and traversed from Milepost 11.0 to 11.9 |
| 6 | 0.0 | 0.5 | 0.5 | Dry lake (Roach Dry lake) | Barren | None | None | None |
| | 0.5 | 0.8 | 0.3 | Dry lake edge | SS | Scrub habitat species expected in low numbers | None | Potential desert tortoise habitat (0 to 50 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 6 (cont.) | 0.8 | 1.4 | 0.6 | Bajada | CBS | Scrub habitat species expected; 2 American kestrels observed | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 1.4 | 1.8 | 0.4 | Small ridge | CBS, sparsely vegetated with cacti (see species list, Table C-4) | Scrub habitat species expected | None | Transient bighorn sheep habitat traversed (Spring Mountains) |
| | 1.8 | 8.5 | 6.7 | Bajada | CBS, enriched with many species (see species list, Table C-3); barren hills above to north | Scrub habitat species expected | None | Potential desert tortoise habitat (40 to 155 density class); known golden eagle and prairie falcon nesting habitat 0.5 to 4 miles north in Clark Mountain Range |
| | 8.5 | 18.0 | 9.5 | Mountain slopes and canyon bottoms (Keany Pass on Clark Mountain) | BS with JTW on higher slopes above corridor and scattered Joshua trees below; see species list, Tables C-4 and C-5; scattered Pinus monophylla and Juniperus osteosperma on higher ridges and in canyons | Scrub and woodland habitat species expected, with elements of montane forest; mule deer, white-tailed antelope squirrel, ravens, rock wren, red-shafted flicker, and black-throated sparrows observed | Potential habitat for Nelson's phacelia and Rusby's desert mallow, Milepost 8.5 to 14.0 | Known bighorn sheep habitat Milepost 10.0 to 13.0 and in surrounding slopes; known golden eagle nesting sites south on Clark Mountain |

Table B-1 (continued)
Inventory of Biological Resources

| Site No. | Miles[a] Begin | End | Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special Interest Species[d] Plants | Wildlife |
|---|---|---|---|---|---|---|---|---|
| 6 (cont.) | 5.6 | 1.4 | 0.4 | Bajada | CHS | Scrub habitat species associated; 2 American kestrels observed | None | Potential desert tortoise habitat (0 to 30 density class) |
| | 1.4 | 1.4 | 0.4 | Small ridge | CHS, sparsely vegetated with much less species list, Table C-4) | Scrub habitat species expected | None | Transient bighorn sheep habitat traversed (Spring Mountains) |
| | 1.8 | 3.5 | 1.7 | Bajada | CHS, enriched with many species (see species list, Table C-1) between hills above to north | Scrub habitat species expected | None | Potential desert tortoise habitat (30 to 125 density class); known golden eagle and prairie falcon nesting habitat 0.5 to 1 miles north in Clark Mountain Range |
| | 3.5 | 13.0 | 9.5 | Intermittent slopes and swales between Spring Mountains and Clark Mountains | DS with JTW to higher elevations above corridor and scattered Joshua trees behind see species list, Table C-4 and C-5) scattered Joshua trees (see species list, Table C-4 and C-5) and Joshua trees (see species list, Table C-4 and C-5) | Scrub and woodland habitat species associated, with elements of montane habitat, Swainson's hawk, desert tortoise, pallid bat, Joshua tree, sparrow, hawk, wren, rock-dwelling lizard, and black-throated sparrow observed | Potential habitat for Inyo's phacelia and Clark's desert mallow, Proposed 0.5 to 1.5 ft | Known bighorn sheep habitat Mile post 10.0 to 13.0 and in surrounding areas Known golden eagle nesting sites south of Clark Mountain |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 6 (cont.) | 18.0 | 20.0 | 2.0 | Upper alluvial slope | CBS; few associated scrub shrub; Bouteloua spp. understory with scattered Opuntia spp; scattered Joshua trees | Scrub habitat species expected; loggerhead shrike observed | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 20.0 | 30.0 | 10.0 | Broad valley and surrounding slopes | CBS with scattered Joshua trees | Scrub habitat species expected; white-crowned sparrow, cactus wren, Brewer's sparrow, and logger-head shrike observed | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 30.0 | 31.0 | 1.0 | Gentle slopes | BS | Scrub habitat species expected | None | None |
| | 31.0 | 44.5 | 13.5 | Mountain slopes, canyons | CBS with scattered Joshua; see species list, Table C-6; DW at Milepost 37.6 and adjacent to corridor to Milepost 39.0; barren hills above | Scrub habitat species expected with elements of woodland habitat assemblage; cactus wren and red-tailed hawk observed | None | Potential desert tortoise habitat Milepost 39.0 to 44.5 (0 to 50 density class) |
| | 44.5 | 45.5 | 1.0 | Narrow alluvial fan | CBS with high density of Hymenoclea salsola and Atriplex hymenelytra | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 6 (cont.) | 45.5 | 47.2 | 1.7 | Narrow alluvial fan and playa edge | CBS with tamarisk trees at substation Milepost 46.3 | Scrub habitat species expected; sage sparrow observed | None | Potential desert tortoise habitat (40 to 155 density class); prairie falcon observed |
| | 47.2 | 48.5 | 1.3 | Playa (Silver Dry Lake) | SS and barren areas | Scrub habitat species expected in low numbers | None | None |
| | 48.5 | 63.2 | 14.7 | Low mountain slopes and broad alluvial fans | CBS with DW at Mileposts 50.5 and 50.8 where greater diversity of shrubs present; barren hills in surrounding areas | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class); adjacent to potential golden eagle and prairie falcon nesting habitat north in Avawatz Mountains, near Milepost 56.0 to 60.0; adjacent to and north of potential golden eagle and prair falcon nesting habitat in Soda Mountains between Milepost 54.0 and 56.0. Potential bighorn sheep movement from Avawatz Mountai to transient range in Soda Mountai between Mileposts 53.0 and 60.0 |
| | 63.2 | 64.0 | 0.8 | Edge of dry playa (Red Pass Lake) | CBS with understory of Hilaria rigida | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class); adjacent to and north of potential golden eagle and prairie falcon nesting habitat in Soda Mountains between Milepo 64.0 and 65.0 |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 6 (cont.) | 64.0 | 82.0 | 18.0 | Bajadas, canyons, rugged slopes | CBS (see species list, Table C-7); most of this length in sparsely vegetated, especially on rugged slopes; sandy DW at Milepost 68.8; northern most stand of crucifixion thorn (Castela emoryi) 2 miles southeast of Milepost 75.0; several minor washes traversed between Mileposts 79.0 and 82.0 | Scrub habitat species expected | None | Scattered potential desert tortoise habitat (0 to 50 density class); potential golden eagle and prairie falcon nesting habitat in adjacent Soda and Alvord mountains; nearby Soda Mountains are transient range for bighorn sheep |
| | 82.0 | 83.3 | 1.3 | Gentle rocky slope | CBS with numerous associated species including Hilaria rigida, Ephedra californica, Psilostrophe cooperi, Eriogonum fasciculatum and E. inflatum | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class); potential golden eagle and prairie falcon habitat 2 miles north on Alvord Mountain |
| 7 | 0.0 | 1.0 | 1.0 | Steep rugged mountain slopes | BS with scattered Joshua trees | Scrub habitat species expected | Potential habitat for Nelson's phacelia and Rusby's desert mallow | Bighorn sheep habitat near Mohawk Hill; known golden eagle nesting habitat 2 miles north on Clark Mountain |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 7 (cont.) | 1.0 | 2.7 | 1.7 | Steep rugged mountain slopes (Clark Mountain) | BS with scattered Joshua trees | Scrub habitat species expected | Potential habitat for Nelson's phacelia and Rusby's desert mallow | Adjacent to bighorn sheep habitat and near known golden eagle nestin area on Clark Mountain |
| | 2.7 | 5.6 | 2.9 | Upper alluvial fan | CBS with scattered Joshua trees; area of Yucca schidigera between Mileposts 2.7 and 4.0 | Scrub and woodland habitat species expected | Potential habitat for Nelson's phacelia and Rusby's desert mallow to Milepost 4.0 | Potential desert tortoise habitat between Mileposts 4.0 and 5.6 (40 to 155 density class) |
| | 5.6 | 5.8 | 0.2 | Lower alluvial fan | CBS and SS transition with Ambrosia dumosa and Hymenoclea salsola | Scrub habitat species expected in low numbers | None | Potential desert tortoise habitat (40 to 155 density class) |
| | 5.8 | 7.5 | 1.7 | Low-lying basin basin | SS with DW at Milepost 7.0 dominated by Chilopsis linearis, Tamarix spp., Atriplex spp. and Gutierrezia spp. | Scrub habitat species expected in low numbers | None | Potential desert tortoise habitat (40 to 155 density class) |
| | 7.5 | 10.4 | 2.9 | Upper bajada | CBS and JTW | Scrub and woodland habitat species expected | None | Potential desert tortoise habitat (40 to 155 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 7 (cont.) | 10.4 | 13.5 | 3.1 | Upper bajada | BS with scattered Joshua trees | Scrub habitat species expected | None | Potential desert tortoise habitat (40 to 155 density class) |
| 8 | 0.0 | 0.6 | 0.6 | Mountain slopes (Clark Mountain) | BS with scattered Joshua trees | Scrub and woodland habitat species expected | Potential habitat for Nelson's phacelia and Rusby's desert mallow | Bighorn sheep habitat near Mohawk Hill; known golden eagle nesting habitat 2 miles north on Clark Mountain |
| | 0.6 | 2.6 | 2.0 | Narrow canyon bottom | BS with scattered Joshua trees | Scrub and woodland habitat species expected | Potential habitat for Nelson's phacelia and Rusby's desert mallow | Adjacent to bighorn sheep habitat and near golden eagle nesting habitat on Clark Mountain |
| | 2.6 | 5.9 | 3.3 | Alluvial fan | CBS with scattered Joshua trees to Milepost 4.5 and groups of Yucca schidigera between Mileposts 2.6 and 3.8 | Scrub and woodland habitat species expected; raven observed | Potential habitat for Nelson's phacelia and Rusby's desert mallow to Milepost 4.0 | Potential desert tortoise habitat between Mileposts 4.0 to 5.9 (40 to 155 density class) |
| | 5.9 | 6.3 | 0.4 | Edge of basin | CBS and SS transition with abundant Ambrosia dumosa and Hymenoclea salsola | Scrub habitat species expected | None | Potential desert tortoise habitat (40 to 155 density class) |
| | 6.3 | 9.1 | 2.8 | Low-lying basin | SS with DW at Milepost 7.3 dominated by Chilopsis linearis, Tamarix ssp., Atriplex ssp. and Gutierrezia spp. | Scrub habitat species expected in low numbers | None | Potential desert tortoise habitat (40 to 155 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 8 (cont.) | 9.1 | 10.0 | 0.9 | Lower alluvial plain | CBS and SS transition with scattered Joshua trees beginning at Milepost 9.5 | Scrub habitat species expected | None | Potential deert tortoise habitat (40 to 155 density class) |
| | 10.0 | 10.8 | 0.8 | Alluvial plain | CBS with Bouteloua spp. understory and scattered Joshua trees | Scrub and woodland habitat species expected | None | Potential desert tortoise habitat (40 to 155 density class) |
| | 10.8 | 12.9 | 2.1 | Upper bajada | BS with scattered Joshua trees | Scrub and woodland habitat species expected | None | Potential desert tortoise habitat (40 to 155 density class) |
| 9 | 0.0 | 2.0 | 2.0 | Broad canyon bottom | BS with scattered Joshua trees | Scrub and woodland habitat species expected | None | None |
| | 2.0 | 3.0 | 1.0 | Steep mountain slopes | CBS; sparse vegetation with scattered Joshua trees | Scrub and woodland habitat species expected | None | None |
| | 3.0 | 6.5 | 3.5 | Steep mountain slopes | CBS, sparsely vegetated | Scrub habitat species expected in low numbers; horned lark observed | None | None |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 9 (cont.) | 6.5 | 20.2 | 13.7 | Alluvial fans, gentle slopes | CBS; sparsely vegetated and homogeneous; tamarisk trees along nearby highway | Scrub habitat species expected; ravens and Brewer's blackbirds observed | None | Potential desert tortoise habitat, 0 to 50 density class between Mileposts 6.5 to 11.5, then 40 to 155 density class to Milepost 20.2 |
| | 20.2 | 20.7 | 0.5 | Low-lying basin (between Silver and Soda dry lakes) | SS | Scrub habitat species expected in low numbers | None | Potential desert tortoise habitat (40 to 155 density class) |
| | 20.7 | 25.0 | 4.3 | Gentle to steep sloping hillside | CBS; barren from Mileposts 20.7 to 21.5; DW at Milepost 24.0 to 24.8 with Dalea spinosa, Hymenoclea salsola, Atriplex hymenelytra, and Encelia spp. | Scrub habitat species expected | None | Potential desert tortoise habitat (40 to 155 density class) |
| 10 | 0.0 | 2.6 | 2.6 | Low hills | BS with scattered Joshua trees | Scrub and woodland habitat species expected | None | None |
| | 2.6 | 5.3 | 2.7 | Upper alluvial fan | CBS with scattered Joshua trees; sparse vegetation | Scrub and woodland habitat species expected | None | None |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 10 (cont.) | 5.3 | 12.0 | 6.7 | Broad alluvial fan | CBS, sparsely vegetated | Scrub habitat species expected | None | None |
| | 12.0 | 14.5 | 2.5 | Broad alluvial fan | CBS | Scrub habitat species expected | None | Potential desert tortoise habitat (40 to 155 density class) |
| | 14.5 | 19.9 | 5.4 | Broad alluvial fan | CBS; tamarisk along highway to the north | Scrub habitat species expected; Brewer's blackbird; starlings, and house sparrows observed near Baker | None | Potential desert tortoise habitat (greater than 155 density class) |
| 11 | 0.0 | 0.7 | 0.7 | Broad plain | CBS with Atriplex hymenelytra, Hymenoclea salsola, and Encelia spp. | Scrub habitat species expected | None | Potential desert tortoise habitat (40 to 155 density class) |
| | 0.7 | 1.7 | 1.0 | Edge of playa | SS with Atriplex spp. and Grayia spinosa | Scrub habitat species expected in low numbers | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 1.7 | 3.7 | 2.0 | Dry lake bed (Soda Lake) | Barren | None | None | None |
| | 3.7 | 5.5 | 1.8 | Edge of playa | SS | Scrub habitat species expected in low numbers | None | Potential desert tortoise habitat (0 to 50 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 11 (cont.) | 5.5 | 7.9 | 2.4 | Narrow bajada | CBS with several minor DW dominated by Dalea spinosa | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 7.9 | 9.0 | 1.1 | Mountain slopes | CBS, sparse vegetation on mountain slopes | Scrub habitat species expected | None | None |
| | 9.0 | 18.0 | 9.0 | Bajadas and gentle slopes; Mojave River Wash | CBS, sparse and homogeneous vegetation | Scrub habitat species expected; raven observed | None | Potential desert tortoise habitat (0 to 50 density class); traverses edge of Soda Mountains between Milepost 8.0-9.0 which is transient bighorn sheep habitat |
| | 18.0 | 20.5 | 2.5 | Mojave River Wash and Cronese Valley (south) | DW; sparse vegetation dominated by Atriplex spp., Ambrosia dumosa, Croton californica; centered to the north near Cronese Valley; Prosopis glandulosa and Chilopsis linearis stands also present | Scrub habitat species expected with DW species | Chilopsis linearis and Prosopis glandulosa sparsely distributed | Potential desert tortoise habitat (0 to 50 density class) |
| 12 | 0.0 | 1.0 | 1.0 | Alluvial plain | CBS with Atriplex hymenelytra, Hymenoclea salsola, and Encelia spp. | Scrub habitat species expected | None | Potential desert tortoise habitat (40 to 155 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 12 (cont.) | 1.0 | 1.3 | 0.3 | Edge of dry lake | SS with Atriplex spp. and Grayia spinosa | Scrub habitat species expected in low numbers | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 1.3 | 2.2 | 0.9 | Dry lake bed (Soda Lake) | Barren | None | None | None |
| | 2.2 | 2.9 | 0.7 | Edge of dry lake | SS | Scrub habitat species expected in low numbers | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 2.9 | 4.9 | 2.0 | Gentle to sloping hillside | CBS with several minor DW at Milepost 3.8 to 4.8 dominated by Dalea spinosa | Scrub habitat species expected; raven observed | None | Potential desert tortoise habitat (0 to 50 density class) |
| 13 | 0.0 | 10.6 | 10.6 | Upper bajadas below barren hills | CBS; open and homogeneous with Opuntia basilaris and Opuntia echinocarpa; several minor DW at Milepost 1.8 to 3.5 dominated by Dalea spinosa; CBS very sparse at Milepost 7.3 to 9.0; sandy CBS at Milepost 9.0 to 10.5 | Scrub habitat species expected; raven observed | None | Potential desert tortoise habitat (0 to 50 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 14 | 0.0 | 1.9 | 1.9 | Edge of dry lake (East Cronese Lake) | CBS | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 1.9 | 4.9 | 3.0 | Dry lake bed and wash (Mojave River Wash and lower East Cronese Lake) | DW dominated by Chilopsis linearis and Prosopis glandulosa hummocks; other species: Atriplex spp., Croton californica, and Argemone corymbosa | Scrub and wash habitat species expected | Prosopis glandulosa and Chilopsis linearis | Potential desert tortoise habitat (0 to 50 density class) |
| 15 | 0.0 | 0.5 | 0.5 | Gentle slope | DW as above | Scrub and wash habitat species expected | Prosopis glandulosa and Chilopsis linearis | Potential desert tortoise habitat (0 to 50 density class) |
| | 0.5 | 0.9 | 0.4 | Slope base | CBS | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 0.9 | 3.2 | 2.3 | Rugged mountains (Cave Mountains) | CBS, sparse vegetation on slopes | Scrub habitat species expected in low numbers | None | Potential bighorn sheep habitat; north extension of Cady Mountain population, 2 miles north of Afton Canyon |
| | 3.2 | 5.0 | 1.8 | Lower mountain slopes | CBS on sandy soil with Hilaria rigida and Bouteloua spp. | Scrub habitat species expected in low numbers | None | Potential desert tortoise habitat (0 to 50 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 16 | 0.0 | 0.3 | 0.3 | Edge of dry lake. | CBS | Scrub habitat species expected in low numbers | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 0.3 | 3.5 | 3.2 | Dry lake bottom (East Cronese Lake) | DW dominated by Chilopsis linearis and Prosopis glandulosa hummocks; other species: Atriplex spp., Croton californica, and Argemone corymbosa | Scrub wash habitat species expected | Chilopsis linearis and Prosopis glandulosa | None |
| | 3.5 | 8.6 | 5.1 | Large canyon bottom (Cronese Valley) | CBS; sandy soils; other species: Hilaria rigida and Bouteloua spp.; sparsely vegetated hills above; sandy washout at Milepost 6.2 to 6.8 | Scrub habitat species expected; white-tailed antelope squirrels observed | None | Potential desert tortoise habitat (0 to 50 density class) |
| 17 | 0.0 | 0.5 | 0.5 | Dry lake bottom and wash area (Mojave River Wash) | DW dominated by Chilopsis linearis and Prosopis glandulosa | Scrub and wash habitat species expected | Chilopsis linearis and Prosopis glandulosa | Potential desert tortoise habitat (0 to 50 density class) |
| | 0.5 | 1.0 | 0.5 | Lower mountain slopes | CBS | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 17 (cont.) | 1.0 | 3.2 | 2.2 | Rugged mountains (Cave Mountains) | CBS, sparse vegetation | Scrub habitat species expected in low numbers | None | Potential bighorn sheep habitat; north extension of Cady Mountain population; 1 to 2 miles north of Afton Canyon |
| | 3.2 | 5.3 | 2.1 | Lower mountain slopes | CBS with sandy soils; other species: Hilaria rigida and Bouteloua spp. | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class); 1 to 2 miles north of Afton Canyon |
| 18 | 0.0 | 3.7 | 3.7 | Broad hillsides and shallow canyons | CBS; sandy and rocky soils with variable plant cover; scattered washes with greater cover | Scrub habitat species expected in low numbers | None | Potential desert tortoise habitat (0 to 50 density class); 0.5 to 1.0 mile north of Mojave River |
| 19 | 0.0 | 8.0 | 8.0 | Upper bajadas | CBS; sandy soil and Hilaria rigida with Bouteloua spp. between Mileposts 0.0 and 3.1; species-rich CBS between Mileposts 3.1 and 8.0 with Hilaria rigida, Ephedra californica, Psilostrophe cooperi, and Eriogonum fasciculatum; sandy DW at Milepost 6.5 | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 20a | 0.0 | 4.8 | 4.8 | Alluvial fan | CBS | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class); potential golden eagle and prairie falcon nesting habitat 3 miles north on Alvord Mountain |
| | 4.8 | 8.8 | 4.0 | Alluvial fan | SS, sparse vegetation | Scrub habitat species expected in low numbers | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 8.8 | 11.0 | 2.2 | Dry lake bed (Coyote Lake) | Barren | None | None | None |
| | 11.0 | 11.2 | 0.2 | Edge of dry lake | SS | Scrub habitat species expected in low numbers | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 11.2 | 21.0 | 9.8 | Alluvial fans, small bajadas and canyons | CBS; relatively homogeneous with Bouteloua spp. understory and scattered Opuntia ramosissima; occasional Joshua trees; surrounding hills are mostly barren | Scrub habitat species expected | Potential habitat for Jaeger's milk-vetch and Mojave fishhook cactus from Milepost 18.5 to 21.0 | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (0 to 50 density class); known golden eagle and prairie falcon nesting habitat in surrounding hills (Lane and Calico mountains) from Milepost 19.0; prairie falcon observed |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 20b | 0.0 | 8.5 | 8.5 | Alluvial fans, small bajadas and canyons | CBS; relatively homogeneous with Bouteloua spp. understory and scattered Opuntia ramosissima; occasional Joshua trees; surrounding hills are mostly barren | Scrub habitat species expected | Potential habitat for Jaeger's milk-vetch and Mojave fishhook cactus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (0 to 50 density class from Milepost 0.0 to 4.0; 100 to 250 density class between Mileposts 4.0 and 8.5); known golden eagle and prairie falcon habitat in surrounding hills (Lane and Calico mountains) between Mileposts 0.0 and 2.0 |
| | 8.5 | 11.0 | 2.5 | Mountain pass (Waterman hills) | CBS and JTW; see species list, Table C-8 | Scrub and woodland habitat species expected; red-tailed hawk observed | Potential habitat for Jaeger's milk-vetch and Mojave fishhook cactus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (0 to 50 density class) |
| | 11.0 | 16.0 | 5.0 | Broad alluvial fan | CBS and DW at Mileposts 11.5 and 12.0; scattered Joshua trees | Scrub habitat species expected | Potential habitat for Mojave spineflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat, 100 to 250 density class between Mileposts 11.0 and 13.0; 0 to 50 density class between Mileposts 13.0 and 16.0 |
| | 16.0 | 16.5 | 0.5 | Valley floor | SS; dominated by Atriplex polycarpa, A. canescens, A. confertifolia, and Grayia spinosa | Scrub habitat species expected in low numbers | Potential habitat for Mojave spineflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (0 to 50 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 20b (cont.) | 16.5 | 17.0 | 0.5 | Small knoll | CBS; other species include: Ambrosia dumosa, Hilaria rigida, Croton californica, Salsola iberica, Oryzopsis spp., and Sporobolus spp. | Scrub habitat species expected | Potential habitat for Mojave spine-flower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (0 to 50 density class) |
| | 17.0 | 17.9 | 0.9 | Small depression | SS | Scrub habitat species expected in low numbers | Potential habitat for Mojave spine-flower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (0 to 50 density class) |
| 21a | 0.0 | 1.0 | 1.0 | Hillside | CBS; sandy soils and abundant bare ground | Scrub habitat species expected in low numbers | None | Potential desert tortoise habitat (0 to 50 density class); 2 to 3 miles south of potential golden eagle and prairie falcon nesting habitat on Alvord Mountain |
| | 1.0 | 4.0 | 3.0 | Broad alluvial fan | CBS | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 4.0 | 4.2 | 0.2 | Alluvial plain | SS; dominated by Atriplex polycarpa, A. canescens, A. confertifolia, A. hymenelytra, and Grayia spinosa | Scrub habitat species expected in low numbers | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 4.2 | 4.5 | 0.3 | Small basin | Barren | None | None | None |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 21a (cont.) | 4.5 | 6.0 | 1.5 | Broad, flat sandy wash area | Sparsely vegetated CBS with agricultural fields and residences throughout | Scrub habitat species expected in low numbers | None | None |
| 21b | 0.0 | 4.0 | 4.0 | Broad, flat sandy wash area | Sparsely vegetated CBS with agricultural fields and residences throughout | Scrub habitat species expected | None | None |
| | 4.0 | 6.4 | 2.4 | Broad, flat sandy wash area | CBS with rich understory of Ambrosia dumosa, Grayia spinosa, Haplopappus spp., Hymenoclea salsola, Gutierrezia spp., Hilaria rigida, Bouteloua spp., and Atriplex canescens | Scrub habitat species expected | Potential habitat for Barstow woolly sunflower | Potential desert tortoise habitat (0 to 50 density class) |
| | 6.4 | 8.0 | 1.6 | Edge of wash area, Mojave River | SS and barren areas near wash | Scrub habitat species expected in low numbers | Potential habitat for Barstow woolly sunflower | Potential desert tortoise habitat (0 to 50 density class); 2 miles south of potential golden eagle and prairie falcon nesting habitat in Calico Mountains at Milepost 14.0 |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 22 | 0.0 | 13.5 | 13.5 | Sandy mesa and broad wash | CBS | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 13.5 | 14.0 | 0.5 | Flat sandy wash area | Croplands | None | None | None |
| | 14.0 | 15.0 | 1.0 | Flat sandy wash area | CBS | Scrub habitat species expected; raven observed | None | Potential desert tortoise habitat (0 to 50 density class); golden eagle observed |
| | 15.0 | 16.0 | 1.0 | Base of rocky hill (Harvard Hill) | CBS on flat area; slopes with CBS and Opuntia echinocarpa and Opuntia englemanii | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class); golden eagle observed |
| | 16.0 | 20.2 | 4.2 | Flat wash area (edge of Mohave River) | CBS with Ambrosia dumosa, Grayia spinosa, Hymenoclea salsola, Gutierrezia spp., Bouteloua spp., Hilaria rigida, and Atriplex canescens | Scrub habitat species expected | Potential habitat for Barstow woolly sunflower | Potential desert tortoise habitat (0 to 50 density class) |
| | 20.2 | 21.2 | 1.0 | Wash area, dunes (edge of Mohave River) | SS and DW with scattered Acacia greggii | Scrub habitat species expected in low numbers | Potential habitat for Barstow woolly sunflower | Potential desert tortoise habitat (0 to 50 density class); 2 miles south of potential golden eagle and prairie falcon nesting habitat in Calico Mountains at Milepost 21.2 |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 23 | 0.0 | 1.5 | 1.5 | Wash area with dunes (Mojave River crossing) | DW; scattered Prosopis glandulosa and Acacia greggii | Scrub habitat species expected in low numbers | None | 2 miles south of potential golden eagle and prairie falcon nesting habitat in Calico Mountains at Milepost 0.0 |
| | 1.5 | 1.7 | 0.2 | Edge of wash | SS | Scrub habitat species expected in low numbers | Potential habitat for Barstow woolly sunflower and Mojave fishhook cactus | Potential desert tortoise habitat (0 to 50 density class) |
| | 1.7 | 3.5 | 1.8 | Broad, flat valley bottom | CBS | Scrub habitat species expected | Potential habitat for Barstow woolly sunflower and Mojave fishhook cactus | Potential desert tortoise habitat (0 to 50 density class) |
| | 3.5 | 4.5 | 1.0 | Valley bottom | Croplands; tamarisks and cottonwoods planted at nearby ranch | None | None | None |
| | 4.5 | 8.5 | 4.0 | Hillside | CBS with Ambrosia dumosa, Ephedra spp., Hymenoclea salsola, Gutierrezia spp. and Opuntia spp.; tamarisks planted along nearby highway | Scrub habitat species expected | Potential habitat for Barstow woolly sunflower and Mojave fishhook cactus | Potential desert tortoise habitat (0 to 50 density class); 4 to 5 miles north of known golden eagle and prairie falcon nesting habitat in the Newberry Mountains |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 23 (cont.) | 8.5 | 13.8 | 5.3 | Upper bajadas and mountain slopes | CBS with numerous small DW at Mileposts 9.5, 10.0 and 11.6 dominated by Acacia greggii, Lycium cooperi, Opuntia ramosissima and Opuntia basilaris; Yucca schidigera scattered in CBS between Mileposts 10.0 and 13.8 | Scrub habitat species expected | Potential habitat for Mojave fishhook cactus | Potential desert tortoise habitat (0 to 50 density class); golden eagle nests previously recorded on transmission towers from Milepost 12.0 |
| 24a | 0.0 | 5.5 | 5.5 | Small hills, bajadas | CBS; sparse on hillsides; with Bouteloua spp. understory between Mileposts 2.7 and 5.5 | Scrub habitat species expected | Potential habitat for Mojave fishhook cactus | Potential desert tortoise habitat (50 to 100 density class) |
| | 5.5 | 8.0 | 2.5 | Small bajadas | CBS | Scrub habitat species expected | Potential habitat for Mojave fishhook cactus | Potential desert tortoise habitat (50 to 100 density class) |
| | 8.0 | 16.0 | 8.0 | Various hills and narrow valleys | CBS; DW at Milepost 12.0 and Atriplex spp., Gutierrezia spp. Hymenoclea salsola | Scrub habitat species expected; loggerhead shrike, raven, and horned larks observed | Potential habitat for Mojave spineflower and Mojave fishhook cactus; nearest population of latter, 2 miles north of Milepost 14.0 at Hodge | Potential desert tortoise habitat (100 to 250 density class); prairie falcon observed at Mileposts 10.0 and 13.5 |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 24a (cont.) | 16.0 | 17.8 | 1.8 | Valley floor | CBS; croplands and built-up areas within 0.5 mile | Scrub habitat species expected | Potential habitat for Mojave spine-flower and Mojave fishhook cactus | Potential desert tortoise habitat (greater than 250 density class) |
| | 17.8 | 18.8 | 1.0 | Edge of wash (Mojave River) | SS; croplands and built-up areas within 0.5 mile | Scrub habitat species expected; mountain bluebird, white-crowned sparrow, house sparrow, western meadowlark, and greater roadrunner | None | None |
| | 18.8 | 19.8 | 1.0 | Wide sandy wash | DW; sparsely vegetated with tamarisk trees and Populus fremontii | Scrub habitat expected; high density of birds expected; raven, northern harrier, ferruginous hawk, Brewer's blackbird, red-tailed hawk, redwing blackbird, starling, black-shouldered kite, and loggerhead shrike observed | None | Golden eagle observed |
| | 19.8 | 21.0 | 1.2 | Edge of wash | SS and croplands; highly disturbed | Scrub habitat expected in low numbers | None | None |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 24a (cont.) | 21.0 | 27.3 | 6.3 | Gentle hills and small valleys; open and sandy; ends at Buckthorn Canyon | CBS with Ambrosia dumosa, Lycium cooperi, Hymenoclea salsola, Gutierrezia spp., and Eriogonum inflatum to Milepost 24.0; CBS with Ambrosia dumosa, Croton californica, Hymenoclea salsola, Opuntia bigelovii, and Opuntia ramosissima | Scrub habitat expected; ravens and kit fox scat observed | Potential habitat for desert cymopterus and Mojave spineflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (50 to 100 density class) between Mileposts 21.0 and 26.0; 100 to 250 density class between Mileposts 26.0 and 27.3; desert tortoise burrow observed at Milepost 23.0 |
| 24b | 0.0 | 0.7 | 0.7 | Hillside on edge of Buckthorn Canyon | SS disturbed by sheep grazing | Scrub habitat species expected | Potential habitat for Mojave spineflower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 0.7 | 2.0 | 1.3 | Gentle slopes | CBS; with Ambrosia dumosa, Croton californica, Hymenoclea salsola, Opuntia bigelovii, Opuntia ramosissima | Scrub habitat species expected; white-tailed ground squirrel observed | Potential habitat for Mojave spineflower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 2.0 | 4.3 | 2.3 | Gentle slopes | SS and CBS mixture | Scrub habitat species expected | Potential habitat for Mojave spineflower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 24b (cont.) | 4.3 | 6.1 | 1.8 | Hillside over wash (Fremont Wash) | CBS with infrequent and scattered Joshua trees | Scrub habitat species expected | Potential habitat for Mojave spine-flower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class); desert tortoise burrows at Milepost 5.5 |
| 25 | 0.0 | 3.0 | 3.0 | Broad alluvial fan | CBS with abundant Hymenoclea salsola | Scrub habitat species expected | Potential habitat for Mojave fish-hook cactus | Potential desert tortoise habitat (50 to 100 density class) |
| | 3.0 | 7.0 | 4.0 | Valley bottom (Stoddard Valley) | CBS; sparsely vegetated, homogeneous with Bouteloua spp. understory | Scrub habitat species expected | Potential habitat for Mojave fish-hook cactus | Potential desert tortoise habitat (50 to 100 density class) |
| | 7.0 | 11.7 | 4.7 | Narrow valley | CBS with Hymenoclea salsola, Ephedra californica, and Psilostrophe cooperii; surrounding hills sparsely vegetated; Yucca schidigera and other species occur in upland areas from Milepost 11.0 (see species list, Table C-9) | Scrub habitat species expected | Potential habitat for Mojave fish-hook cactus | Potential desert tortoise habitat (100 to 250 density class); potential golden eagle and prairie falcon nesting habitat 2 to 3 miles south on Stoddard Ridge |
| 26 | 0.0 | 0.6 | 0.6 | Mountain pass | CBS; rich in species, see species list, Table C-9 | Scrub habitat species expected | Potential habitat for Mojave fish-hook cactus | Potential desert tortoise habitat (0 to 50 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 27 (cont.) | 0.0 | 5.5 | 5.5 | Hillsides, narrow pass, and edge of valley | CBS with understory of Hymenoclea salsola, Bouteloua spp. and Eriogonum inflatum to Milepost 2.5; no understory to Milepost 5.5 | Scrub habitat species expected | Potential habitat for Mojave spineflower | Potential desert tortoise habitat (greater than 250 density class) |
| | 5.5 | 6.5 | 1.0 | Upper alluvial fan | CBS with scattered Yucca schidigera | Scrub habitat species expected; white-tailed antelope squirrel observed | Potential habitat for Mojave fishhook cactus and Mojave spineflower | Potential desert tortoise habitat (greater than 250 density class) |
| | 6.5 | 8.0 | 1.5 | Mountain pass | CBS with scattered Yucca schidigera and numerous other species (see species list, Table C-9); area of previous fire | Scrub habitat species expected; white-tailed antelope squirrel observed | Potential habitat for Mojave fishhook cactus and Mojave spineflower | Potential desert tortoise habitat (0 to 50 density class) |
| | 8.0 | 12.0 | 4.0 | Broad alluvial | CBS | Scrub habitat species expected; American kestrel observed | Potential habitat for Mojave fishhook cactus and Mojave spineflower; known population of the latter 1 mile north | Potential desert tortoise habitat (100 to 250 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 27 (cont.) | 12.0 | 13.0 | 1.0 | Open wash area; water present in narrow channel (Mojave River) | DW, sparsely vegetated | Scrub habitat species expected in low numbers | None | None |
| | 13.2 | 13.4 | 0.2 | Main channel Mojave River | RW on west side of river; see species list, Table C-10 | Riparian woodland habitat species expected; cooper's hawk, killdeer, great blue heron, American kestrel, Say's phoebe, turkey vulture, house finch, Nuttall's woodpecker, black-billed gnatcatcher, raven, common loon, American root, common merganser, western grebe, red-billed grebe, gad-wall, American widgeon, and various ducks observed | None | None |
| | 13.2 | 13.4 | 0.2 | Bluffs overlooking river | Highly disturbed CBS; sparsely vegetated; see species list, Table C-11 | Scrub habitat species expected in low numbers | None | None |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 28 | 0.0 | 0.6 | 0.6 | Relatively flat terrain | Highly disturbed CBS; sparsely vegetated; see species list, Table C-11 | Scrub habitat species expected in low numbers | None | None |
| | 0.6 | 1.0 | 0.4 | Relatively flat terrain | SS | Scrub habitat species expected | Potential habitat for Mojave spine-flower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 1.0 | 3.2 | 2.2 | Gentle slopes and shallow depressions | CBS with small pockets of SS | Scrub habitat species expected | Potential habitat for Mojave spine-flower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| 29 | 0.0 | 1.5 | 1.5 | Sandy wash (Fremont Wash) | SS; highly disturbed by off-road vehicles | Scrub habitat species expected | Potential habitat for Mojave spine-flower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 1.5 | 2.1 | 0.6 | Edge of wash | CBS | Scrub habitat species expected | Potential habitat for Mojave spine-flower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| 30 | 0.0 | 1.0 | 1.0 | Edge of wash | CBS | Scrub habitat species expected; red-tailed hawks observed | Potential habitat for Mojave spine-flower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 30 (cont.) | 1.0 | 2.1 | 1.1 | Fremont Wash area | JTW | Woodland habitat species expected | Potential habitat for Mojave spine-flower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| 31 | 0.0 | 1.2 | 1.2 | Broad, flat alluvial fan | JTW | Woodland habitat species expected | Potential habitat for Mojave spine-flower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (50 to 100 density class) |
| | 1.2 | 2.0 | 0.8 | Broad alluvial plain | CBS and SS mixture with scattered Joshua trees | Scrub habitat species expected | Potential habitat for Mojave spine-flower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (50 to 100 density class) |
| | 2.0 | 3.4 | 1.4 | Broad alluvial plain | JTW | Woodland habitat species expected | Potential habitat for Mojave spine-flower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (50 to 100 density class) |
| | 3.4 | 5.7 | 2.3 | Broad alluvial plain | CBS with scattered, infrequent Joshua trees | Scrub habitat species expected | Potential habitat for Mojave spine-flower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (50 to 100 density class) |
| 32 | 0.0 | 1.7 | 1.7 | Bajada | CBS with scattered *Yucca schidigera* | Scrub habitat species expected | Potential habitat for Mojave spine-flower and Mojave fishhook cactus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 32 (cont.) | 1.7 | 2.6 | 0.9 | Alluvial fan | CBS; species rich; see species list, Table C-9 | Scrub habitat species expected | Potential habitat for Mojave spine-flower and Mojave fishhook cactus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 2.6 | 7.6 | 5.0 | Gentle slopes and valleys | CBS | Scrub habitat species expected; raven and mountain bluebird observed | Potential habitat for Mojave spine-flower and Mojave fishhook cactus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class); prairie falcon observed |
| | 7.6 | 9.8 | 2.2 | Hills | CBS; species rich; see species list, Table C-9 | Scrub habitat species expected | Potential habitat for Mojave spine-flower and Mojave fishhook cactus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (0 to 50 density class) |
| | 9.8 | 14.5 | 4.7 | Relatively steep hillsides | CBS with Yucca schidigera, Hymenoclea salsola, and scattered Joshua trees | Scrub habitat species expected | Potential habitat for Mojave spine-flower and Mojave fishhook cactus; nearest population of the latter at Milepost 11.0 and 0.7 mile north on Quartzite Mountain | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (0 to 50 density class); potential golden eagle and prairie falcon nesting habitat 0.7 mile north on Quartzite Mountain |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 32 (cont.) | 14.5 | 14.6 | 0.1 | Mojave River | RW; Populus fremontii and tamarisk with associated species (see species list, Table C-12); agriculture and built-up areas of Victorville in surrounding area | Riparian woodland habitat species expected; western bluebird, red-tailed hawk, lesser goldfinch, Say's phoebe, black phoebe, song sparrow, white-crowned sparrow, ruby-crowned knight, rock wren, red-shafted flicker, loggerhead shrike, and western meadowlark observed | None | None |
| | 14.6 | 15.0 | 0.4 | Mojave River | DW; no vegetation, little surface water | Scrub habitat species expected | None | None |
| | 15.0 | 15.2 | 0.2 | Edge of river | Cropland | None | None | None |
| | 15.2 | 16.4 | 1.2 | Hills | CBS with widely scattered Joshua trees | Scrub habitat species expected | Potential habitat for Mojave spineflower and Mojave fishhook cactus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (0 to 50 density class) |
| 33 | 0.0 | 1.8 | 1.8 | Bajada | CBS with scattered Yucca schidigera | Scrub habitat species expected | Potential habitat for Mojave spineflower and Mojave fishhook cactus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 33 (cont.) | 1.8 | 2.6 | 0.8 | Alluvial fan | CBS; species rich; see species list, Table C-9 | Scrub habitat species expected | Potential habitat for Mojave spine-flower and Mojave fishhook cactus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 2.6 | 8.2 | 5.6 | Gentle slopes and valleys | CBS | Scrub habitat species expected | Potential habitat for Mojave spine-flower and Mojave fishhook cactus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 8.2 | 10.2 | 2.0 | Hills | CBS; species rich; see species list, Table C-9 | Scrub habitat species expected | Potential habitat for Mojave spine-flower and Mojave fishhook cactus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (0 to 50 density class) |
| | 10.2 | 14.6 | 4.4 | Relatively steep hillsides | CBS with Yucca schidigera, Hymenoclea salsola, and scattered Joshua trees | Scrub habitat species expected | Potential habitat for Mojave spine-flower and Mojave fishhook cactus; nearest population of latter 1 mile on Quartzite Mountain | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (0 to 50 density class); potential golden eagle and prairie falcon nesting habitat 1 mile north on Quartzite Mountain |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 33 (cont.) | 14.6 | 14.8 | 0.2 | Mojave River | RW; Populus fremontii and tamarisk with associated species (see species list, Table C-12); agriculture and built-up areas of Victorville in surrounding area | Riparian woodland habitat species expected; western bluebird, red-tailed hawk, lesser goldfinch, Say's phoebe, black phoebe, song sparrow, white-crowned sparrow, ruby-crowned kinglet, rock wren, red-shafted flicker, loggerhead shrike, and western meadowlark observed | None | None |
| | 14.8 | 15.7 | 0.9 | Bluff above river | CBS with widely scattered Joshua trees; built-up areas of Victorville in surrounding area | Scrub habitat species expected in low numbers | Potential habitat for Mojave spineflower and Mojave fishhook cactus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (0 to 50 density class) |
| 34 | 0.0 | 1.0 | 1.0 | Low hill | CBS with widely scattered Joshua trees; adjacent to built-up areas; see species list, Table C-13 | Scrub habitat species expected in low numbers | Potential habitat for Mojave spineflower and Mojave fishhook cactus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (0 to 50 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 34 (cont.) | 1.0 | 1.4 | 0.4 | Sandy wash | DW with infrequent Populus fremontii; other species include Distichlis spicata, Hymenoclea salsola, Chrysomanus spp., Gutierrezia spp., Salsola iberica, Atriplex polycarpa, and Atriplex canescens | Scrub habitat species expected; red-tailed hawk observed | None | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (0 to 50 density class) |
| 35 | 0.0 | 4.7 | 4.7 | Broad alluvial fan | CBS with widely scattered Joshua trees (see species list, Table C-12) | Scrub habitat species expected; raven and red-tailed hawk observed | Potential habitat for desert cymopterus and Mojave spineflower; nearest population of the latter 2.5 miles north near Adelanto | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (0 to 50 density class) |
| 36 | 0.0 | 0.3 | 0.3 | Bluffs above river | CBS with widely scattered Joshua trees | Scrub habitat species expected | Potential habitat for Mojave spineflower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 0.3 | 0.9 | 0.6 | Relatively flat terrain | SS | Scrub habitat species expected | Potential habitat for Mojave spineflower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 36 (cont.) | 0.9 | 4.8 | 3.9 | Relatively flat terrain | CBS with widely scattered Joshua trees | Scrub habitat species expected | Potential habitat for Mojave spineflower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class); desert tortoise burrows observed |
| | 4.8 | 5.9 | 1.1 | Relatively flat terrain | JTW | Woodland habitat species expected | Potential habitat for Mojave spineflower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| 37 | 0.0 | 0.9 | 0.9 | Broad alluvial plain | CBS | Scrub habitat species expected | Potential habitat for Mojave spineflower, desert cymopterus, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (50 to 100 density class) |
| | 0.9 | 1.7 | 0.8 | Broad low-lying area | SS; see species list, Table C-14 | Scrub habitat species expected | Potential habitat for Mojave spineflower, desert cymopterus, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (50 to 100 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 37 (cont.) | 1.7 | 3.7 | 2.0 | Broad alluvial plain | CBS and SS mixture | Scrub habitat species expected | Potential habitat for Mojave spine-flower, desert cymopterus, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (50 to 100 density class) |
| | 3.7 | 6.8 | 3.1 | Gentle alluvial fan | CBS with widely scattered Joshua trees | Scrub habitat species expected | Potential habitat for Mojave spine-flower, desert cymopterus, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (50 to 100 density class) between Mileposts 3.7 and 5.0; 100 to 250 density class between Mileposts 5.0 and 6.8 |
| | 6.8 | 7.3 | 0.5 | Low hills (Kramer Hills) | JTW | Woodland habitat species expected; red-tailed hawk observed | Potential habitat for Mojave spine-flower, desert cymopterus, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| 38 | 0.0 | 1.2 | 1.2 | Broad alluvial fan | CBS | Scrub habitat species expected; red-tailed hawk observed | Potential habitat for Mojave spine-flower, desert cymopterus, and Barstow woolly sunflower; nearest populations of latter 1.2 miles north in ACEC | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (50 to 100 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 38 (cont.) | 1.2 | 5.4 | 4.2 | Broad, low-lying area | SS | Scrub habitat species expected; white-tailed antelope squirrel observed | Potential habitat for Mojave spine-flower, desert cymopterus, and Barstow woolly sunflower; nearest populations of the former two species 2 miles west of Kramer Junction; nearest population of last species 2 miles north in ACEC | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (50 to 100 density class) |
| | 5.4 | 7.5 | 2.1 | Broad, low-lying area | CBS and SS mixture | Scrub habitat species expected | Potential habitat for Mojave spine-flower, desert cymopterus, and Barstow woolly sunflower; nearest populations of the former two species 2 miles west of Kramer Junction | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (50 to 100 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 38 (cont.) | 7.5 | 9.7 | 2.2 | Broad alluvial fan | CBS | Scrub habitat species expected; red-tailed hawk observed | Potential habitat for Mojave spine-flower, desert cymopterus, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (50 to 100 density class) |
| | 9.7 | 10.3 | 0.6 | Low hills (Kramer Hills) | JTW | Woodland habitat species expected | Potential habitat for Mojave spine-flower, desert cymopterus, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (50 to 100 density class) |
| 39 | 0.0 | 0.5 | 0.5 | Relatively flat area | JTW | Scrub habitat species expected | Potential habitat for Mojave spine-flower, desert cymopterus, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 0.5 | 2.0 | 1.5 | Relatively flat area | CBS; DW at Milepost 1.1 | Scrub habitat species expected | Potential habitat for Mojave spine-flower, desert cymopterus, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 39 (cont.) | 2.0 | 3.0 | 1.0 | Low-lying area | SS with scattered minor DWs | Scrub habitat species expected | Potential habitat for Mojave spine-flower, desert cymopterus, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 3.0 | 4.7 | 1.7 | Relatively flat area | CBS with DW at Mile-post 3.3 | Scrub habitat species expected; red-tailed hawk observed | Potential habitat for Mojave spine-flower, desert cymopterus, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 4.7 | 6.2 | 1.5 | Low-lying area | SS | Scrub habitat species expected; red-tailed hawk observed | Potential habitat for Mojave spine-flower, desert cymopterus, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| 40a | 0.0 | 1.3 | 1.3 | Low-lying area | SS | Scrub habitat species expected | Potential habitat for Mojave spine-flower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 40a (cont.) | 1.3 | 3.2 | 1.9 | Relatively flat alluvial plain | CBS with widely scattered Joshua trees | Scrub habitat species expected | Potential habitat for Mojave spineflower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 3.2 | 4.2 | 1.0 | Low-lying area | SS | Scrub habitat species expected | Potential habitat for Mojave spineflower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 4.2 | 6.2 | 2.0 | Broad alluvial plain | CBS with widely scattered Joshua trees | Scrub habitat species expected | Potential habitat for Mojave spineflower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| 40b | 0.0 | 4.9 | 4.9 | Broad alluvial plain | CBS with widely scattered Joshua trees | Scrub habitat species expected; raven, loggerhead shrike, red-tailed hawk, and white-tailed antelope squirrel observed | Potential habitat for Mojave spineflower and desert cymopterus | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class); desert tortoise shell observed |
| 41 | 0.0 | 7.0 | 7.0 | Low-lying area | SS; see species list, Table C-4; grazed area between Mileposts 3.0 and 4.5; cropland nearby between Mileposts 6.0 and 7.0; relatively | Scrub habitat species expected; red-tailed hawk and American kestrel observed | Potential habitat for Mojave spineflower, desert cymopterus, and Barstow woolly sunflower; popula- | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class); golden eagle and prairie falcon observed |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 41 (cont.) | | | | | sparse vegetation to Milepost 3.0; partial extension of Harper Dry Lake bed at Milepost 2.5; spring at Milepost 2.5 with tamarisk and Populus fremontii | | tions of spineflower and sunflower 1.5 miles south of Milepost 7.0 | |
| | 7.0 | 8.5 | 1.5 | Relatively flat area | CBS | Scrub habitat species expected | Potential habitat for desert cymopterus, Mojave spineflower, and Barstow woolly sunflower; populations of the latter species 1.5 miles south of Milepost 7.0 | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class); desert tortoise burrows and golden eagle observed |
| | 8.5 | 9.6 | 1.1 | Relatively flat area | SS | Scrub habitat species expected | Potential habitat for desert cymopterus, Mojave spineflower, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 41 (cont.) | 9.6 | 10.4 | 0.8 | Sandy wash area | SS with high species diversity | Scrub habitat species expected | Potential habitat for desert cymopterus, Mojave spineflower, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 10.4 | 15.0 | 4.6 | Broad, sandy alluvial fan | SS; sparsely vegetated | Scrub habitat species expected | Potential habitat for desert cymopterus, Mojave spineflower, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 15.0 | 15.5 | 0.5 | Relatively flat area | CBS | Scrub habitat species expected | Potential habitat for desert cymopterus, Mojave spineflower, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (50 to 100 density class) |
| 42 | 0.0 | 1.3 | 1.3 | Low-lying area | SS dominated by *Atriplex canescens*, *Atriplex confertifolia*, and *Grayia spinosa* | Scrub habitat species expected | Potential habitat for desert cymopterus, Mojave spineflower, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 42 (cont.) | 1.3 | 4.5 | 3.2 | Base of slopes | CBS; sparse on hills; Hilaria rigida understory; integrades with SS | Scrub habitat species expected | Potential habitat for desert cymopterus, Mojave spineflower, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 4.5 | 5.0 | 0.5 | Low-lying area | SS | Scrub habitat species expected | Potential habitat for desert cymopterus, Mojave spineflower, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 5.0 | 6.2 | 1.2 | Base of small hill | CBS | Scrub habitat species expected | Potential habitat for desert cymopterus, Mojave spineflower, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 6.2 | 12.6 | 6.4 | Broad low-lying areas | SS | Scrub habitat species expected | Potential habitat for desert cymopterus, Mojave spineflower, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 42 (cont.) | 12.6 | 20.9 | 8.3 | Broad alluvial fan and flat areas | CBS with SS south of line between Mileposts 17.0 and 20.0 | Scrub habitat species expected | Potential habitat for desert cymopterus, Mojave spineflower, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 20.9 | 21.9 | 1.0 | Relatively flat area | SS | Scrub habitat species expected; red-tailed hawk observed | Potential habitat for desert cymopterus, Mojave spineflower, and Barstow woolly sunflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class); tortoise burrow observed |
| 43 | 0.0 | 0.6 | 0.6 | Edge of Buckthorn Canyon | SS | Scrub habitat species expected | Potential habitat for desert cymopterus and Mojave spineflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 0.6 | 1.5 | 0.9 | Broad alluvial fan | CBS | Scrub habitat species expected | Potential habitat for desert cymopterus and Mojave spineflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| | 1.5 | 2.5 | 1.0 | Broad alluvial fan | SS | Scrub habitat species expected | Potential habitat for desert cymopterus and Mojave spineflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|
| 43 (cont.) | 2.5 | 3.9 | 1.4 | Broad alluvial fan | CBS | Scrub habitat species expected | Potential habitat for desert cymopterus and Mojave spineflower | Potential Mohave ground squirrel habitat; potential desert tortoise habitat (100 to 250 density class) |
| 44 | 0.0 | 6.5 | 6.5 | Broad, flat sandy area | Sparsely vegetated CBS with agricultural fields and occasional residence near Milepost 0.0 to 2.0 | Scrub habitat species expected | None | None |
| | 6.5 | 16.2 | 9.7 | Alluvial fans, small bajadas and canyons | CBS with scattered Opuntia ramosissima; much of surrounding hills are barren | Scrub habitat species expected | Potential habitat for Mojave fishhook cactus between Mileposts 12.5 and 16.2 | Known golden eagle and prairie falcon nesting habitat in nearby Lane and Calico mountains from Milepost 12.5 to 16.2 |
| 45 | 0.0 | 4.5 | 4.5 | Broad gentle slope | CBS | Scrub habitat species expected | None | Potential desert tortoise habitat (0 to 50 density class) |
| | 4.5 | 5.0 | 0.5 | Edge of playa | SS | Scrub habitat species expected in low numbers | None | None |
| | 5.0 | 5.7 | 0.7 | Dry lake (Ivanpah Dry Lake) | Barren | None | None | None |

Table B-1 (continued)
Inventory of Biological Resources

| Link No. | Milepost Begin | Milepost End | Milepost Length | Topographic Conditions | Vegetation Type[b] | Wildlife[c] | Legally Protected and Special-Interest Species[d] Plants | Legally Protected and Special-Interest Species[d] Wildlife |
|---|---|---|---|---|---|---|---|---|

Footnotes:

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[a]Biological resources within and adjacent to corridors are shown on Figure 4-2 (Vegetation) and 4-3 (Wildlife).

[b]CBS = creosote bush scrub, dominated by Larrea tridentata and other species as described in the text or as noted; SS = saltbush scrub; BS = blackbush scrub; DW = desert wash scrub; RW = riparian woodland; JTW = Joshua tree woodland; all vegetation types described in text.

[c]Common and characteristic species of each habitat type described in text.

[d]Legally protected and special-interest species described in text. Density class for desert tortoise habitat represents estimate of density (individuals per square mile) based on available literature and BLM file data.

# APPENDIX C

## PLANT SPECIES OBSERVED DURING FIELD SURVEYS

TABLE C-1
PLANT SPECIES OBSERVED DURING FIELD SURVEYS

| Species List Number | Scientific Name |
|---|---|
| C-1 | Ambrosia dumosa |
| | Bouteloua spp. |
| | Chrysothamnus spp. |
| | Erioneuron pulchellum |
| | Krameria parviflora |
| | Larrea tridentata |
| | Pectis papposa |
| | Psilostrophe cooperi |
| | Oenothera deltoides |
| | Opuntia basilaris |
| | Opuntia echinocarpa |
| | Salsola iberica |
| | Sporobolus contractus |
| C-2 | Acacia greggii |
| | Ambrosia dumosa |
| | Atriplex canescens |
| | Bouteloua spp. |
| | Chrysothamnus spp. |
| | Echinocactus polycephalus |
| | Echinocereus spp. |
| | Encelia spp. |
| | Ephedra californica |
| | Eriogonum deflexum |
| | E. fasciculatum |
| | E. inflatum |
| | Erioneuron pulchellum |
| | Ferocactus acanthoides |
| | Hilaria rigida |
| | Krameria grayi |
| | Larrea tridentata |
| | Opuntia acanthocarpa |
| | O. basilaris |
| | Physalis spp. |
| | Penstemon spp. |
| | Sphaeralcea ambigua |
| | Stephanomeria spp. |
| | Yucca schidigera |

Table C-1 (continued)
Plant Species Observed During Field Surveys

| Species List Number | Scientific Name |
|---|---|
| C-3 | Acacia greggii |
| | Ambrosia dumosa |
| | Chilopsis linearis |
| | Chrysothamnus spp. |
| | Echinocactus polycephalus |
| | Echinocereus spp. |
| | Encelia virginensis |
| | Ephedra californica |
| | Eriogonum deflexum |
| | E. fasciculatum |
| | E. inflatum |
| | Ferocactus acanthoides |
| | Gutierrezia spp. |
| | Hymenoclea salsola |
| | Krameria grayi |
| | Larrea tridentata |
| | Opuntia acanthocarpa |
| | O. basilaris |
| | O. echinocarpa |
| | O. ramosissima |
| | Salizaria mexicana |
| | Stephanomeria spp. |
| | Yucca schidigera |
| C-4 | Coleogyne ramosissima |
| | Ephedra californica |
| | Eriogonum spp. |
| | Eurotia lanata |
| | Grayia spinosa |
| | Juniperus osteosperma |
| | Pinus monophylla |
| | Thamnosma montana |
| C-5 | Agave utahensis ssp. nevadensis |
| | Ephedra viridis |
| | Yucca baccata |
| | Y. brevifolia |
| | Y. schidigera |

Table C-1 (continued)
Plant Species Observed During Field Surveys

| Species List Number | Scientific Name |
|---|---|
| C-1 | Agoseris grandiflora |
| | Antennaria dimorpha |
| | Calochortus luteus |
| | Chaenactis sp. |
| | Eriophyllum confertiflorum |
| | Erodium cicutarium |
| | Erodium botrys |
| | Erodium moschatum |
| | Erodium sp. |
| | Gilia capitata |
| | Gilia sinuata |
| | Gilia tenuiflora |
| | Gilia sp. |
| | Hemizonia fitchii |
| | Hemizonia sp. |
| | Lactuca serriola |
| | Lepidium nitidum |
| | Lepidium sp. |
| | Lupinus bicolor |
| | Lupinus sp. |
| | Malacothrix sp. |
| | Microseris douglasii |
| | Microseris sp. |
| | Navarretia sp. |
| | Oenothera deltoides |
| | Oenothera sp. |
| | Phacelia cicutaria |
| | Phacelia ciliata |
| | Phacelia sp. |
| | Plantago erecta |
| | Plantago sp. |
| | Sisyrinchium bellum |
| | Sisyrinchium sp. |
| | Trifolium gracilentum |
| | Trifolium sp. |
| | Vicia sativa |
| | Vicia sp. |
| | Zauschneria latifolia |
| | Zauschneria sp. |
| C-2 | Calycadenia multiglandulosa |
| | Centaurea melitensis |
| | Crocidium sp. |
| | Cuscuta sp. |
| | Cuscuta californica |
| | Cuscuta sp. |
| | Eriophyllum confertiflorum |
| | Gilia tenuiflora |
| | Plantago erecta |
| C-3 | Acmispon wrangelianus |
| | Calandrinia ciliata |
| | Vicia sativa |
| | Vicia sp. |
| | Zauschneria latifolia |
| | Zauschneria sp. |

Table C-1 (continued)
Plant Species Observed During Field Surveys

| Species List Number | Scientific Name |
|---|---|
| C-6 | Acacia greggii |
| | Atriplex hymenelytra |
| | A. polycarpa |
| | Brickellia spp. |
| | Chilopsis linearis |
| | Chrysothamnus spp. |
| | Echinocactus polycephalus |
| | Encelia spp. |
| | Eriogonum deflexum |
| | E. fasciculatum |
| | E. inflatum |
| | Eurotia lanata |
| | Ferocactus acanthoides |
| | Haplopappus spp. |
| | Hymenoclea salsola |
| | Larrea tridentata |
| | Lycium cooperi |
| | Menodora spinosa |
| | Nicotiana trigonophylla |
| | Opuntia basilaris |
| | O. echinocarpa |
| | O. ramosissima |
| | Phoradendron spp. |
| | Psilostrophe cooperi |
| | Salizaria mexicana |
| | Yucca brevifolia |
| | Y. schidigera |
| C-7 | Ambrosia dumosa |
| | Atriplex hymenelytra |
| | Eriogonum fasciculatum |
| | E. inflatum |
| | Grayia spinosa |
| | Haplopappus spp. |
| | Larrea tridentata |
| | Opuntia basilaris |
| | O. ramosissima |
| | Psilotrophe cooperi |

Table C-1 (continued)
Plant Species Observed During Field Surveys

| Species List Number | Scientific Name |
|---|---|
| C-8 | Abronia villosa |
| | Ambrosia dumosa |
| | Astragalus spp. |
| | Chrysothamnus spp. |
| | Croton californica |
| | Cucurbita foetidissima |
| | Ephedra californica |
| | Eriogonum fasciculatum |
| | E. inflatum |
| | Grayia spinosa |
| | Hilaria spinosa |
| | Hymenoclea salsola |
| | Larrea tridentata |
| | Menodora spinescens |
| | Nicotiana trigonophylla |
| | Oenothera spp. |
| | Oryzopsis spp. |
| | Prunus fremontii |
| | Psilostrophe cooperi |
| | Salizaria mexicana |
| | Yucca brevifolia |
| C-9 | Ambrosia dumosa |
| | Encelia spp. |
| | Echinocactus polycephalus |
| | Echinocereus spp. |
| | Eriogonum fasciculatum |
| | E. inflatum |
| | Eurotia lanata |
| | Ferocactus acanthoides |
| | Gutierrezia spp. |
| | Hymenoclea salsola |
| | Larrea tridentata |
| | Opuntia basilaris |
| | O. bigelovii |
| | O. ramosissima |
| | Psilostrophe cooperi |
| | Yucca schidigera |

Table C-1 (continued)
Plant Species Observed During Field Surveys

| Species List Number | Scientific Name |
|---|---|
| C-10 | Ambrosia dumosa |
| | Atriplex canescens |
| | A. polycarpa |
| | Baccharis spp. |
| | Brickellia spp. |
| | Chilopsis linearis |
| | Chrysothamnus spp. |
| | Gutierrezia spp. |
| | Haplopappus spp. |
| | Populus fremontii |
| | Tamarix spp. |
| C-11 | Ambrosia dumosa |
| | Ephedra californica |
| | Eriogonum fasciculatum |
| | E. inflatum |
| | Hymenoclea salsola |
| | Larrea tridentata |
| | Opuntia spp. |
| | Prunus fremontii |
| C-12 | Ambrosia dumosa |
| | Atriplex canescens |
| | A. polycarpa |
| | Chrysothamnus spp. |
| | Distichlis spicata |
| | Ephedra californica |
| | Eriogonum spp. |
| | Gutierrezia spp. |
| | Grayia spinosa |
| | Hymenoclea salsola |
| | Lycium cooperi |
| | Populus fremontii |
| | Salsola iberica |
| | Tamarix spp. |

Table C-1 (continued)
Plant Species Observed During Field Surveys

| Species List Number | Scientific Name |
|---|---|
| C-13 | Ambrosia dumosa |
| | Encelia spp. |
| | Ephedra californica |
| | Eriogonum inflatum |
| | Grayia spinosa |
| | Hymenoclea salsola |
| | Larrea tridentata |
| | Lycium cooperi |
| | Opuntia bigelovii |
| C-14 | Ambrosia dumosa |
| | Atriplex canescens |
| | A. confertifolia |
| | A. hymenelytra |
| | A. polycarpa |
| | Eurotia lanata |
| | Grayia spinosa |
| | Lycium cooperi |
| | Prunus fremontii |
| | Salsola iberica |

[a]Species list numbers keyed to observation notes in Table B-1.